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SAN FRANCISCO CITY PLANNING COMMISSION
AND SAN FRANCISCO REDEVELOPMENT AGENCY

ENVIRONMENTAL IMPACT REPORT

YERBA BUENA CENTER

DRAFT
VOLUME II

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D. ECONOMICS

1. GENERALIZED ECONOMIC IMPACTS ASSOCIATED WITH YERBA BUENA CENTER ALTERNATIVES

Certain broad economic impacts would be experienced under any of the YBC planning alternatives, related primarily to the scale and mix of space uses in the area as it is developed, and would fall into two categories:

- o Changes in the relative importance of the YBC vicinity and existing centers of commerce and recreation in San Francisco such as the Financial district, the northern waterfront area, and the Civic Center.

- o Changes in the relative well-being of San Franciscans caused by income-oriented changes due to the completion of the development proposed. Employment increases, if any, would be the most important element of this type.

Impacts of Yerba Buena Center As A Major New Activity Area

Any of the four YBC alternatives under review would eventually produce (1) new commercial space and certain residential additions; (2) a considerable daytime working population, and some nighttime visits, and (3) a series of attractions, such as the convention center and possibly a recreation/entertainment park, that would tend to reinforce the vicinity as the newest zone of day and night activity in San Francisco. The completion of YBC to the levels suggested by the four alternatives could result in the construction of a nearly six-year citywide supply of office space in Alternatives A and D, and a one- to three-year supply in Alternatives C and B. Not all future office space users would desire a YBC location, so the actual absorption of office space in YBC would be a function of the total San Francisco office market, of projects being developed elsewhere on parcels nearer the center of the Financial District,

on the northern waterfront, near Candlestick Park, and of the rate of space actually added in the YBC area by redevelopers. (See Appendix D, Part 3, for a discussion of office space trends in San Francisco.)

Retail space that might be added under the alternatives ranges from the 190,000 sq. ft. in Alternative C to a high of 680,000 sq. ft. in Alternative A. These levels may be compared with the approximate scale of shopping centers found in less urban locations: 100,000 sq. ft. for a convenience center and more than 500,000 sq. ft. for a regional center.[1]

Alternatives A and D include the construction of 602 housing units for the elderly. This represents 4% of all housing units completed in San Francisco since 1968, and 41% of all San Francisco housing units completed in 1976. Alternatives B and D, and possibly the Redevelopment Agency November 1977 tentative proposal, call for construction of 902 elderly and family units, which is 6% of all units completed since 1968 and 61% of all housing units completed in San Francisco in 1976.[2]

The Commercial Development Study Team for the Mayor's Select Committee in 1976 pointed out: "In the future, it appears that apparel manufacturing, printing and publishing, and incubator industries will provide the most active demand for space in the (South-of-Market) area"[3]. The apparel industry is the second largest manufacturing industry in the City, and the only one to realize a substantial absolute employment growth with employment increasing by 1,470 during the 1962-72 period, and by 1,290 between 1972 and 1973. The proposed apparel mart, to the extent that it would promote San Francisco's fashion and design leadership, might have a complementary effect upon the apparel manufacturing industry in San Francisco's South-of-Market industrial areas. Announced expansion of an existing apparel facility at Fourth and Market Sts., adjacent to YBC, indicates the strength of the industry in San Francisco, but may reduce the demand for space in the YBC apparel mart. The fraction of space for general office use in the poropsed YBC apparel mart has not been fixed.

Visits to the vicinity attributable to the convention center and, if developed, a recreation/entertainment park, would occur. Estimates of

attendance at the new convention center functions are not available, but experience in other cities indicates that perhaps 255,000 delegates (1980) annually would attend functions in the facility.[4] One recent study of the recreation/entertainment park calls for an annual visitation level of up to 6.5 million.[5] Thus, the number of people circulating through the area daily would represent an increase over the present (see Section VI. F.).

Previous reports on YBC discussed the future of existing facilities, given a new convention center in YBC. The 1973 EIR explored delegate attendance projections for a new convention center and for the existing San Francisco facilities at Brooks Hall and the Civic Auditorium after a YBC facility would be in operation. A drop in Brooks Hall attendance was projected, from a level of 136,000 projected for 1980 without the YBC convention center down to some 65,500 with a YBC facility.

Because publicly owned convention centers must set their user fees at a level which will make them competitive with similar facilities in other cities, nearly all convention centers operate at a loss. In 1976-77 the Civic Auditorium and Brooks Hall experienced a net operating loss of $343,748. Included in this loss calculation were salaries and mandatory fringe benefits paid to 11 Department of Public Works employees who work full time at the Civic Auditorium and Brooks Hall. Most of the operating costs for Brooks Hall and the Civic Auditorium are incurred for salaries, benefits, and overtime pay for a combined staff of 40 persons. Any debt service on the structures and facilities is not included in budget calculations.[6]

Brooks Hall and the Civic Auditorium operated at or near full booking capacity in fiscal year 1976-77.[6] With competition from the new YBC convention center, operation of the older facilities at less than full capacity (at least in initial years) could be expected, and operating revenues might be expected to decline. Because most of the Brooks Hall-Civic Auditorium expenses are for wages and salaries for maintenance and direct labor, some reduction of operating expenses, and shifting of

personnel from the older facilities to the new YBC convention center might be possible. The actual balance of revenues and operating expenses for any of the facilities, new and old, is not easily determined at this point.

Information on recent convention experience in San Francisco and on Bay Area meeting and exhibit hall space is in Appendix D, Parts 4 and 5. Attendance projections for the recreation/entertainment park forecast an intensive use of the proposed facility. Peak period use of that YBC park which would occur on weekends in the summer tourist season is projected at some 26,000 visitors daily.[7] A recent study of the Fisherman's Wharf area disclosed similar ranges of visitation; the Mayor's Select Committee Commercial Development Team presented similar findings.[8]

Were the recreation/entertainment park to be developed, it is reasonable to assume that the YBC area would emerge as a competitive influence in the overall City pattern of attraction to visitors. With that park in full operation, increases in the need for public protection, traffic management and related population-oriented services could be expected (see Sections VI.E and F).

Other Economic Impacts From Full Development

Citizens of San Francisco would experience certain general socioeconomic impacts from the development of any YBC alternative. One impact would be the general elevation of personal and business income in the City, on a temporary basis, flowing from construction, and later from net permanent employment generated.[9]

Other general impacts affecting the relative well-being of San Francisco residents are: (1) increases in the value of private properties, and revenues flowing from those increases to local public agencies; (2) any costs of servicing the development added in YBC which are not offset directly by user charges or additional public revenues; (3) increases in the local housing stock associated with full development; (4) increases in general business activity associated with completion of the new convention

center facility; and (5) similar, related phenomena that revolve around income generation and public finance.

Estimates have been made on the various levels of income and employment in the City that might be developed from YBC activities on a "multiplied basis" (see particularly Arthur D. Little, 1973,[4] Chapter C; and Rosenstein & Fulton, 1973[25]). No agreement has been reached on the actual amounts of income in total that local residents and others might receive, but it is generally deemed to be large. The 1973 EIR estimated a multiplier of 2.4 as a reasonable indicator of secondary impacts. This multiplier can be applied to the YBC alternative employment estimates of Table 34, page 255, to give an estimate of secondary employment in the Bay Area. More detailed analysis is beyond the scope of this EIR.

2. EMPLOYMENT

Employment Projections

Estimates indicate that by 1980 from 250 permanent jobs under Alternatives C and D to 410-420 jobs under Alternatives A and B and the Redevelopment Agency tentative proposal would be created. These represent an increase of 5% to 9% over the 1977 YBC work force of approximately 4,600. In 1988 the estimates range from a low of 5,900 new permanent jobs under Alternative C to a high of 35,000 new permanent jobs under Alternative D, representing an increase of 128% to 760% over the 1977 YBC work force.

Table 34, page 255, shows gross new employment projected to 1980 and 1988 by occupational category for each of the YBC alternatives. Office workers comprise the largest component of the new employment generated by each alternative. Over the range of alternatives office workers would represent about 60-95% of the new workers in 1980 and about 70-85% in 1988.

As shown in Table 35, page 256, gross employment projections indicate that the largest group of persons employed under any of the

alternatives would work in clerical and service occupations in 1980 and in clerical jobs in 1988. In 1988 Alternative D would provide the most jobs (mainly clerical, service, professional, sales, and managerial) and Alternative C would provide the fewest jobs (mainly clerical and professional). Alternative D would provide the most jobs in most categories. The number of jobs provided by the Redevelopment Agency tentative proposal would fall between the provisions of Alternatives A and B, depending on the amounts of office, commercial and industrial space provided by the plan.

Net Employment Additions

Net employment is defined as that which would not be generated elsewhere if YBC were not developed. Table 36, page 257, presents estimated net employment additions resulting from the land uses in each alternative assuming that the major sources of net additions to employment would come from the convention center, the recreation/entertainment park and the public park. It is assumed, for example, that office development could occur elsewhere in the City, but that a convention center would not be developed elsewhere. This assumption would mean that, in the absence of YBC development, market forces would lead to the development of equivalent amounts of employment-generating office space elsewhere in San Francisco. Thus, this analysis is a worst-case treatment of net employment. In Section VI.D.3, page 271, the assumption is made that 50% of all future YBC development would be "net"; that is, that YBC would capture some of the development that might occur elsewhere under market forces.

The breakdown of the total net employment additions by occupational category and alternative is shown in Table 37, page 257. In absolute numbers the greatest number of net employment additions under Alternative B would be in the occupational categories of sales workers, service workers, and operators. However, laborers would have the highest percentage relative to total employment in the category. If the recreation/entertainment park were built as part of the Redevelopment

Agency tentative proposal, or as a variant of Alternative A, the net employment additions and the numbers of new employees per occupational group would be the same as in Alternative B; if a public park were built, new employment would be the same as in Alternative A.

Union Participation in YBC Employment

Citywide construction jobs for union members declined steadily from 1972 to 1976 and increased slightly in 1977; exact figures are not available.[10] The decline can be associated with the migration of construction activity away from San Francisco. The most recent average unemployment rate for union members engaged in the construction industry is estimated to be 15% (November 1977).

It is estimated that from 4,400 person-years (Alternative C) to 13,900 person-years (Alternative A) in YBC construction employment would be required for the period 1977-1988. Table 38, page 258, indicates variations in construction costs (the basis for estimated construction employment) and employment person-years among alternatives. Nearly all of the YBC-induced construction jobs which include craftsmen and foremen, operatives, transport and laborers are expected to be held by union members.[10,11]

The largest category of permanent new employees would be that of office workers. There are 3,000 Office and Professional Employees International Union members in San Francisco, most of them clerical workers.[12] They constitute about 2.5% of the clerical workers in San Francisco. Assuming a similar union/non-union percentage among new office workers in YBC, a range from 125[13] to 635[14] of the new office employees would be unionized.

According to union representatives,[15] approximately 95% of the retail sales workers in the city of San Francisco are union members. A similar percent would be expected for new retail sales workers within the YBC area. This would mean from about 160[16] to 5,800[17] of the total retail employment category would be unionized.

The growth in service employment on a citywide basis has been increasing at a relatively steady annual rate of 7%. Although the current percentage of union representation among service employees is not available, most of the new service jobs generated by the YBC project development alternatives are expected to be held by workers organized by the Building Service Employees Union Local 87.[18]

TABLE 34

PERMANENT (NEW) EMPLOYMENT ESTIMATES FOR YBC PLAN ALTERNATIVES, BY LAND USE TYPE

EMPLOYMENT - 1980

PLAN ALTERNATIVE	OFFICE	RETAIL	LIGHT INDUSTRY	DOWNTOWN SUPPORT	CONVENTION CENTER	REC/ENT PARK	OTHER*	TOTAL
A	240	10	--	--	160	--	10	420
B	240	10	--	--	160	--	--	410
C	240	10	--	--	--	--	--	250
D	240	10	--	--	--	--	--	250

EMPLOYMENT - 1988

PLAN ALTERNATIVE	OFFICE	RETAIL	LIGHT INDUSTRY	DOWNTOWN SUPPORT	CONVENTION CENTER	REC/ENT PARK	OTHER*	TOTAL
A	25,410	860	2,150	--	160	10***	510	29,100
B	10,900	440	690	--	160	1,600	10	13,800
C	4,990	170	720	--	---	18***	2	5,900
D	12,340	430	3,100	19,030**	--	--	--	34,900

*Includes employment related to following uses: community services, pedestrian concourse, parking and commercial entertainment.
**Based on 6,340,000 square feet of development, with employment calculated on the basis of 60% office, 30% retail and 10% services.
***These numbers apply to the public park.

TABLE 35

ESTIMATED NEW PERMANENT EMPLOYMENT FOR YBC PLAN ALTERNATIVES, BY OCCUPATION GROUPS

1980

OCCUPATIONAL CATEGORY	NUMBER OF EMPLOYEES/PLAN ALTERNATIVE A	B	C	D
PROFESSIONALS	50	50	50	50
MANAGERS	50	50	40	40
CLERICAL	120	120	90	90
SALES WORKERS	40	40	30	30
CRAFTSMEN & FOREMEN	--	--	--	--
OPERATIVES (BUILDING ENGINEERS)	--	--	--	--
TRANSPORT	--	--	--	--
LABORERS	30	20	--	--
SERVICE WORKERS	130	130	40	40
TOTAL	420	410	250	250

1988

OCCUPATIONAL CATEGORY	NUMBER OF EMPLOYEES/PLAN ALTERNATIVE A	B	C	D
PROFESSIONALS	5,080	2,180	1,000	5,500
MANAGERS	4,030	1,720	800	4,600
CLERICAL	10,600	4,620	2,060	11,400
SALES WORKERS	3,150	2,210	610	4,710
CRAFTSMEN & FOREMEN	300	120	90	400
OPERATIVES (BUILDING ENGINEERS)	1,400	850	470	2,010
TRANSPORT	30	10	10	200
LABORERS	40	20	30	30
SERVICE WORKERS	4,470	2,080	830	6,150
TOTAL	29,100	13,800	5,900	34,900

SOURCE: Lord and LeBlanc and Jefferson Associates.

TABLE 36

ESTIMATED NET PERMANENT EMPLOYMENT ADDITIONS, YBC, 1988

Uses Resulting in Permanent Employment Additions	ALTERNATIVES A	B	C	D
Convention Center	160	160	--	--
Public or Recreation/ Entertainment Park	10	1,600	20	--
TOTAL	170	1,760	20	--

TABLE 37

ESTIMATED NET EMPLOYMENT ADDITIONS BY OCCUPATIONAL GROUPS, YBC, 1988

Occupation Category	Number of Employees by Plan Alternatives A		B		C		D
Managers	10	(0.25)*	10	(0.6)	-		-
Clerical	15	(0.14)	180	(3.9)	-		-
Sales Workers	10	(0.32)	800	(36.2)	-		-
Service Workers	85	(1.90)	330	(15.9)	3	(0.36)	-
Craftsmen/Foremen	25	(8.33)	25	(20.8)	2	(2.22)	-
Laborers	25	(62.50)	15	(75.0)	15	(50.00)	-
Operatives	-		400	(47.1)	-		-
TOTAL	170		1,760		20		-

*Figures in parentheses represent net new YBC employment additions as percentages of total new permanent employment in 1988 (Table 35).

SOURCES: Based on Tables 34, 36, Lord & LeBlanc and Jefferson Associates.

TABLE 38

POTENTIAL CONSTRUCTION EMPLOYMENT, YBC PLAN ALTERNATIVES, 1977-1988

Plan Alternatives	Total Estimated Construction Cost	1977-1988 Construction Employment+ (Person Years)
A	$629,000,000	13,900
B	$376,000,000	8,400
C	$202,000,000	4,400
D	$593,000,000	12,800

+Based on the proportion of construction costs for labor (40%), assuming $98 average wage per day and 185 construction work days per year.

SOURCE: Lord & LeBlanc.

3. AREA FINANCING - DIRECT AND INDIRECT FINANCIAL IMPACTS OF PLAN ALTERNATIVES

Financial impacts of YBC alternatives would fall into one of four categories:

o Direct impacts on the San Francisco Redevelopment Agency in terms of the balance of revenues and costs, its ability to settle the present HUD Loan & Grant Agreement for the project, and the net financial requirement on the part of the Agency to complete the entire development program.

o Indirect impacts on the Agency's ability to fund operations and certain improvement costs, related to the use of tax allocation financing.

o Direct impacts on the City of San Francisco related to the costs of public facilities to be provided by local funds, and the balance of revenues and costs of public services required for each alternative.

o Indirect impacts on City accounts related to the requirements for long-term financing, and the consequent impact on general City finances.

The first three are discussed in this section. The last is discussed in Section VI.D. 4, page 274.

Direct Impacts On The San Francisco Redevelopment Agency

Direct impacts on the Redevelopment Agency resulting from any of the YBC alternatives would be of two types: (1) changes in the Agency's capacity to settle accounts with the United States Government within the spirit of the current HUD Loan & Grant Agreement; and (2) funding requirements to complete YBC over and above those covered within the HUD Loan & Grant Agreement. With respect to the first item, settlement with HUD, Table 39 profiles the Agency's "balance sheet" for settlement purposes, relating the required provision of a local share to project costs and receipts from land sales. In this comparative table, no YBC alternative appears to detract from the ability of the Agency to meet the required local share or one-third of net redevelopment project costs under the HUD formula. The critical variable in this instance is the amount of local cash and non-cash credits applicable to the HUD financing formula. All of the alternatives, A through D, provide a sufficient local share credit to clear the HUD-approved agreement.

A related element of impact on the Redevelopment Agency is somewhat more complicated, as it involves an analysis of the entire citywide redevelopment program drawing upon HUD-provided funds. The issue is whether the Agency, under the four YBC alternatives, could settle all HUD agreements for the seven[19] projects supported with federal loans and grants.

Redevelopment agencies are permitted by HUD to pool all projects for purposes of covering the required one-third local share of net project costs. Therefore, each YBC alternative must be substituted for the current plan on a "pooled" or aggregated basis. In Table 40, page 262, this revised "pooling" of all costs, land sales proceeds, and requirements

to provide the local share is illustrated by substituting each plan alternative for the current Agency financial program for YBC. The finding from this analysis is that although the amount of surplus "pooled credits" from all project operations is considerably diminished by inserting the plan alternatives, there still remains a surplus of $3.0 to $6.0 million, after accounting for changes in the locally funded investments, to be placed in YBC. The surplus resulting from implementation of the Redevelopment Agency November 1977 tentative proposal would be between the $6.0 million of Alternative B and the $6.3 million of Alternative A as shown in Table 40, page 262. The variable throughout this analysis which controls the results is the amount of non-cash credit or locally funded improvement projects in each alternative. This amount has been decreased from the expected level of publicly financed improvements contained in the 1973 YBC Redevelopment Plan amendments.

These calculations do not show, however, the probable net funding requirement for completion of any of the YBC alternatives. To reach this figure, it is necessary to compile all costs to date, expected future costs, and the expected sales proceeds from land disposition that are under the control of the Redevelopment Agency.

Table 41, page 264, illustrates the ranges of net funding required if the Redevelopment Agency continues to control YBC activities. Combining HUD-approved expenditures with estimated future costs provides a level of Cumulative Costs To Completion; deducting the available federal grants, local share contributions, and expected land sales receipts provides a Residual Unfunded Costs total (or a surplus of cash if revenues exceed all costs to complete). Any residual unfunded liability would be the amount that would have to be secured by the Redevelopment Agency from other than HUD Loan & Grant Agreement sources for a continuation of redevelopment activities into the future. The results of the analysis show:

- Alternative A could generate a funding surplus of some $2.7 million, using the lower sales proceeds estimate of $26.4 million or a surplus of some $10.9 million if the Agency's current higher estimate of land value is accurate.

TABLE 39

POTENTIAL REDEVELOPMENT AGENCY FINANCIAL PROGRAM CHANGES, YBC ALTERNATIVES, WITH VARIATIONS IN NON-CASH CREDITS ONLY (Millions of Dollars)

	PLAN ALTERNATIVES*			
	A	B	C	D
ITEM I COSTS**	$ 68.0	$ 68.0	$ 68.0	$ 68.0
ITEM II COSTS**	38.5	37.5	35.5	33.0
Gross Project Cost	$106.5	$105.5	$103.5	$101.0
Less: Land Sales Proceeds***	(26.4)	(26.4)	(26.4)	(26.4)
Net Project Cost	$ 80.1	$ 79.1	$ 77.1	$ 74.6
Minimum Local Share Required (1/3)+	27.0	26.0	26.0	25.0
Local Share Provided by Cash ($2.8) and Non-Cash Credits	$ 41.3	$ 40.3	$ 38.3	$ 35.8

*All costs expressed as expenditures to date plus 1977 dollar (uninflated or discounted) future cost estimates.
**Item I Costs are financed with Agency funds; Item II Costs are financed by other public agencies.
***Land sales proceeds represent a subtraction from the running totals. This figure is the amount approved by HUD.
+Rounded

SOURCES: San Francisco Redevelopment Agency; Lord & LeBlanc.

TABLE 40

IMPLICATIONS OF YBC ALTERNATIVES ON TOTAL SAN FRANCISCO REDEVELOPMENT AGENCY PROJECT FINANCING (Millions of Dollars, 1976 Estimates)

	All Projects Pooled*	Current Program for All Projects Modified on Basis of Plan Alternatives			
		A	B	C	D
ITEM I COSTS	$317.0	$317.0	$317.0	$317.0	$317.0
ITEM II COSTS (Non-Cash)	122.0	103.5	102.5	100.5	98.0
Gross Project Cost	$439.0	$420.5	$419.5	$417.5	$415.0
Land Sales Proceeds	(96.0)	(96.0)	(96.0)	(96.0)	(96.0)
Net Project Cost	$343.0	$324.5	$323.5	$321.5	$319.0
Local Share Required (1/3)	114.0	108.0	108.0	107.0	106.0
Local Share to be Provided:					
1. Minimum Share	$114.0	$108.0	$108.0	$107.0	$106.0
2. Pooling Credits**	18.2	6.3	6.0	4.0	3.0

*Currently approved overall program for 7 projects: Western Addition, Diamond Heights, Yerba Buena Center, Golden Gateway, Hunters Point, India Basin, Stockton-Sacramento.
**"Pooling credits" are the sum total of overages and underages from 7 projects as calculated by the Redevelopment Agency. The pooled credits may be applied to any project financing requirement.

SOURCES: San Francisco Redevelopment Agency; Lord & LeBlanc.

o Alternative B could generate from $3.2 million to $8.0 million in working surplus, depending on the land sales proceeds received.

o Alternative C might generate a similar range of surplus proceeds, dependent on land values.

o Alternative D, although appearing to generate a substantial surplus of cash, would not likely produce more than one-half this amount in total by 1988.[20] Therefore, were Alternative D actually followed, perhaps half the full amount of land sales value would be realized, or $25 million, producing a surplus very close to that possible under the old program.

Surplus proceeds generated by the Redevelopment Agency tentative proposal would range between those produced by Alternatives A and B. The amount would depend on which of the components were chosen to make up the YBC plan.

The analysis presented in Table 41 is only indicative of a range of possibilities. Three variables would control the actual balance of costs and offsetting revenues for any YBC alternative. These are: (1) the actual costs to complete the redevelopment activity, including all administrative, interest and capital expenses to complete the facilities actually provided; (2) the actual provision of local "credit" in the form of locally funded capital projects, and HUD approval of the amount of credit sought; and (3) the actual land sales proceeds received by the Agency from resale of the disposition parcels. All three variables are dependent on economic conditions, the time cost of money, inflationary trends, and the like. It is expected, therefore, that the estimated balance of costs and revenues to the overall program of the Redevelopment Agency would change from time to time as redevelopment program characteristics are modified.

The extent of the dependency of YBC upon a strong national and regional economy is unknown. Poor economic conditions (rising interest rates, high unemployment, low business expansion rates) would restrict the completion of YBC after the public investment components were

TABLE 41

ESTIMATED YBC PROJECT COSTS AND OFFSETTING REVENUES,
REDEVELOPMENT AGENCY OPERATIONS, 1977-1988
(Millions of 1977 Dollars for Costs to Complete)

	PLAN ALTERNATIVES			
	A	B	C	D
Costs to Date				
Item I*	$ 63.0	$ 63.0	$ 63.0	$ 63.0
Item II*	16.0	16.0	16.0	16.0
Total to Date	$ 79.0	$ 79.0	$ 79.0	$ 79.0
Costs to Complete				
Item I - Type*	10.3	9.8	9.5	1.3
Item II - Type**	22.5	21.5	19.5	17.0
Total Additions	$ 32.8	$ 31.3	$ 29.0	$ 28.3
Cumulative Costs to Completion	$111.8	$110.3	$108.0	$107.3
Less: Federal Grant	(46.8)	(46.8)	(46.8)	(46.8)
Less: Local Grants-in-Aid, composed of	(41.3)	(40.3)	(38.3)	(35.8)
1. Cash G.I.A	2.8	2.8	2.8	2.8
2. Non-Cash (Item II Costs)	38.5	37.5	35.5	33.0
Less: Land Sales Proceeds, either:				
1. HUD Approved Program, or	(26.4)	(26.4)	(26.4)	(26.4)
2. 1977 SFRA Estimate	(34.6)	(31.2)	(31.9)	(51.5)
Residual Unfunded Costs (or Surplus Receipts)*** either				
With HUD Approved Program	$(2.7)	$(3.2)	$(3.5)	$(1.7)
or With 1977 SFRA Estimate	(10.9)	(8.0)	(9.0)	NA

*Administration, planning and legal, property management, interest, etc.
**Capital improvements qualifying as local non-cash grants-in-aid.
***The 1977 San Francisco Redevelopment Agency estimates of Alternative D proceeds are not market-related and not usable at full value.

SOURCES: San Francisco Redevelopment Agency; Lord & LeBlanc.

installed. Poor economic conditions would tend to depress private corporate expansion goals and slow private YBC construction activity. This condition would not necessarily cut receipts from land sales, however, unless the land sales rate were exceptionally slow in early years, leaving more land in the Agency's hands and less in the hands of private owners with plans for new facilities. Overall, were economic conditions to worsen, the Agency might be able to dispose of sites, but owners might scale down or postpone the development of structures on those sites.

Indirect Impacts On The Redevelopment Agency

The Redevelopment Agency would experience indirect financial impacts from each alternative related to (1) the ability of the Agency to issue tax allocation bonds, and (2) the ability of the Agency to issue lease-revenue bonds.

Of alternatives A through D, only A, B and C appear realistic in terms of implementation; for D, the physical planning aspects are feasible as an alternative, but the legal and financial aspects are not. It is unlikely, in the EIR team (Lord and LeBlanc) judgment, that the United States Government would permit reversion of the redevelopment project to an "auction" or bulk sale of the entire planning area, simply to avoid further local costs of carrying out the program. Even though HUD tends to favor local agency claims in the settlement of renewal program obligations, an alternative that would drop all pretense of complying with the adopted redevelopment plan or a similar but modified plan may be too radical for HUD to accept as an option. The federal government has a minimum investment of $46.8 million in the area, and considerable HUD time and effort has been allocated to YBC in recent years.

The impact of each of the alternatives in terms of a realistic rate of development can only be speculated upon, mainly due to the lack of a specific set of projections available to the Redevelopment Agency or the City of San Francisco. For Alternatives A, B and C and the Redevelopment Agency tentative proposal, this does not appear as serious

as it does with D; only in D does the amount of development relate solely to local zoning limits which would permit the greatest intensity of land use of the four alternatives and would increase the land sales proceeds. It is unlikely that the levels of floor area suggested and assumed by Alternative D could be absorbed in the San Francisco market within the next decade (see Section VI.D.1, p. 248). Further, the assumption that the auction of all land would relieve the Agency of any further administrative and capital improvement costs may not be realistic. If this were to occur, some other agency, probably the City and County generally, would have to incur administrative costs to close out the project. Though the specific agencies would differ, the same community-at-large would have to cover the balance required.

<u>Costs of Public Facilities Provided by Local Funds</u>

Each of the YBC alternatives would have certain aggregate public agency land purchase and capital costs. Included in these required public expenditures would be the specific Redevelopment Agency costs identified in an earlier portion of this report (see Table 39, page 261). Table 42 contains a summary of the committed or potential costs to the City for facilities associated with each plan alternative. Each major cost so identified is either a land purchase cost (land to be acquired from the Redevelopment Agency), a construction cost, or a combination of the two. The figures in Table 42 show the land acquisition and construction costs to the City (and to the Redevelopment Agency) as they have been developed to date.

In Alternative A the plan calls for development of the convention center, certain pedestrian concourse improvements connecting the center with Market Street, and construction of public parking to serve the entire area. In total, the Redevelopment Agency and the City, drawing on their own legal powers, would together generate some $113 million in capital expenditures and land purchases to make Alternative A a reality. If the development of a parking program eliminates public expenditures in this category, the total would be lower by some $10 million. For purposes of this analysis, all parking in garages which are not a part of a private structure is presumed to be publicly financed.

TABLE 42

ESTIMATED PUBLIC AGENCY IMPROVEMENT COSTS TO COMPLETE YBC
(Capital Costs in Millions of 1977 Dollars)

COST ITEM/SPONSOR*	PLAN ALTERNATIVES			
Land Acquisition	A	B	C	D
Convention Center Site (City & County)	$ 6.7	$ 6.7	$ --	$ --
Pedestrian Concourse (City & County)	5.3	3.6	3.6	--
Parking Garage Site(s) (Parking Authority)	1.2	0.5	--	--
City Park Site (City & County)	--	4.4	15.4	--
Construction				
Convention Center (City & County)	$ 75.0	$ 75.0	$ --	$ --
Pedestrian Concourse/BART Access (Redevelopment)	5.5	4.5	2.5	1.5
Parking Garage(s) (Parking Authority)	8.8	8.8	--	--
Park Improvements (City & County)	--	--	9.1	--
SUB-TOTAL	$102.5	$103.5	$30.6	$1.5
Contingency (10%)	10.2	10.3	3.1	0.1
TOTAL	$112.7	$113.8	$33.7	$1.6

*Does not include any administrative, financial, or related costs, or previous expenditures.

SOURCE: Lord & LeBlanc

Alternatives B through D have public costs of nearly $114 million for Alternative B, including the convention center as in A; approximately $34 million for Alternative C, consisting mainly of a total of almost $25 million for the city park in this scheme; and, as there are limited public improvements in Alternative D, where sites would simply be sold on the private market with no further public investment, the only public cost would be for the concourse and BART access at $1.6 million. The Redevelopment Agency tentative proposal would have public costs the same as those of Alternative A if the public park and pedestrian concourse were constructed; public costs would be similar to those of Alternative B if the recreation/entertainment park were built in CB-2 and -3.

In each example profiled in Table 42, the lead agency would be the one generating the actual construction of the improvement, but not necessarily funding it, except in the broadest sense of responsibility. For instance, in the case of the convention center, it is anticipated that lease revenue bonds would be sold by the Redevelopment Agency itself; but actual construction management and operating control would be vested in a designated agency within the City and County government. Further, although the Agency would issue the revenue bonds, it is the City and County, through its lease arrangement supporting the bond payment, that would pledge to meet debt service and related expenses.

Public parking might be somewhat different, as the San Francisco Parking Authority could itself issue parking revenue bonds and manage development of the garages.[21] Ownership and operating specifics are yet to be developed for any public parking that may be installed.

Municipal & Other Service Costs Associated With Full Development of YBC.

Each of the four alternatives would carry certain recurring service costs to local government above the costs of capital and repayment of debt for facilities. Typically, these service costs would be: (1) maintenance costs of those public spaces that are not covered by charges for use; (2) public protection costs, including police, fire, and public health; (3)

operating and maintenance costs of new public transportation services, if required; and (4) operating and maintenance costs of new public works to serve the area, if any (such as sewage treatment facilities, water pumping plants, etc.).

Of the group of service costs above, the first, that of maintenance costs, is estimated to total some $170,000 per year for Alternative A; $88,000 annually for B; and up to $550,000 annually for C. Maintenance costs for the Redevelopment Agency tentative proposal would be similar to those of Alternatives A or B, depending on the presence or absence of a privately maintained recreation/entertainment park. These charges are related to maintenance of the pedestrian ways in all three alternatives, and of the public park in Alternative C. No public spaces of consequence are contained in Alternative D.[22] Maintenance costs of the access ways and open spaces related directly to the convention center are assumed to be borne by the annual operating budget of that facility. These costs should be recaptured annually through rentals for the facility itself.

Estimates of public service needs for each alternative developed to date with representatives of the San Francisco Departments of Public Works, Police, Fire, Water, and Public Health, and of the San Francisco School District, indicate that no additional capital costs or staffing requirements are associated with the alternatives.[23] If these opinions hold, there would be no net public service costs associated with full development of the YBC parcels.

Any public service costs that are not offset directly by user charges would be drawing upon various allocated and unallocated revenues from the YBC development program as it is carried forward. In this context, unallocated revenues are those not already directed to public improvement costs or debt service for the convention center or other public facilities. Annual property tax revenues flowing directly from the area may be pledged to support tax allocation bonding to repay redevelopment costs.

Unallocated Revenues From YBC Alternatives. Each of the alternatives under study would produce certain unallocated annual revenues to the City,. Some of these revenues could serve as potential offsets to the service costs mentioned previously. Of the revenues that are not yet specifically set aside for retirement of debt or other purposes, the following are likely to be the greatest:

o Sales tax revenues from YBC retailing and entertainment-oriented sales (1% to the City);

o Business taxes (gross receipts or payroll taxes) from firms locating in YBC ($2.00 per $1,000 of gross receipts or 1.1% of gross payroll);[24]

o Net operating income from public facilities, such as the convention center, meeting halls and the like;

o Receipts from any land leases or air rights agreements granted redevelopers of parcels; and

o Surcharges on utilities and parking garages: 5% for the utilities user and 10 to 15% against parking charges.[24]

Table 43, page 272, provides a summary of these unallocated revenues from full development within each plan alternative. (The Redevelopment Agency tentative proposal would be between the amounts estimated for Alternatives A and B.) Those revenues that cannot be accurately expressed as a function of full development are so indicated. There are a number of variables to be considered. With respect to any income from the operation of public facilities such as the convention center itself, or other public uses such as parking garages, it is assumed that limited income would be realized over and above debt service to repay the costs of construction and operating expenses. Previous studies of proposed YBC public facilities have touched upon the variations in revenue production from public facility alternatives.[25] Most studies have not anticipated much additional revenue from the convention center facilities. Parking garages are seen to produce some additional revenue to the City,

but this is a function of assumed turnover and rates, based on old YBC development assumptions. For this analysis, no measurable additional parking revenues are added to the resources available.

The assumed production of sales tax and business tax revenues to the City is based on an assumption that up to 50% of all activity so generated in YBC structures would be new, or net revenue over and above that which would have occurred in any event without a YBC. Selection of such an assumed level of new revenue generation from YBC business activities is arbitrary and is higher than that of the worst-case treatment in Section VI.D.2. The actual split between new and transferred or relocated elements is impossible to predict until a pattern of development would begin to emerge on the remaining parcels set aside for employment-generating construction. If YBC were promoted on a national basis, and corporate interest in adding new employment to San Francisco were high, it is likely that more net effects would be felt. If the reverse were to occur, activity in YBC would be primarily at the expense of other locations in the City.

Support For Tax Allocation Financing: Projected Full Development Values. The major uncommitted financial vehicle related to full development of any YBC alternative is the use of the tax allocation or tax increment technique of redevelopment project financing. This method of financing permits redevelopment agencies to issue tax allocation bonds based on projected increases in annual tax revenues (the increment) after the area is redeveloped for new uses.[26] Assessed valuation generated over and above the "frozen base" for YBC (an estimated $11.3 million)[27] is the basis for production of the annual tax increment applicable to the use of the bonding technique. According to State law, proceeds from this technique could be used for any purpose sponsored by the Redevelopment Agency.

The first consideration in the use of tax allocation funding is the overall, long-term generation of new values through the redevelopment program. This involves a calculation of the likely value added from each

TABLE 43

POTENTIAL YBC REVENUES AVAILABLE AT FULL DEVELOPMENT
TO OFFSET LOCAL SERVICING COSTS (In Millions of 1977 Dollars Annually)

REVENUE CATEGORY*	PLAN ALTERNATIVES A	B	C	D
San Francisco Share of Sales Taxes from Retailing Activity in Area	$0.27	$0.25	$0.05	$0.70
Payroll Taxes at 1.1% of Estimated On-Site Employee Payrolls	2.06	0.97	0.43	1.68
Utility Invoice Surcharges	0.11	0.06	0.06	0.12
Parking Surcharges	0.15	0.15	NA	NA
TOTALS	$2.59	$1.43	$0.54	$2.50

*Retailing and employee payroll tax generation estimated on the basis of a 50% net increment to local accounts. The remaining 50% is the normal increment expected. Utility taxes at 5% of estimated cost to YBC buildings times 50%. Parking surcharges at 10% of estimated parking charges.

SOURCE: Lord and LeBlanc

major new use in the project area, and an adjustment for the "frozen base" set as the baseline for incremental growth in tax revenues.

Table 44 presents estimated YBC growth from each alternative in 1977 dollars; the effects of inflation and appreciation of properties are not included. The approximate generation of tax increments annually at full development is indicated. The components of the growth in market and assessed value of each alternative (assumed to be 25% of market value in this calculation) are illustrated for comparison purposes. Land is separated from the value of construction added, to show the multiplier effects of higher densities on total area values per alternative. Various

TABLE 44

TAXABLE VALUE ADDED BY FULL REDEVELOPMENT, YBC PLAN ALTERNATIVES
(After March 1, 1977; Millions of 1977 Dollars)

	PLAN ALTERNATIVES			
	A	B	C	D
Adjusted Taxable Land Values	$ 18.0	$ 17.0	$ 7.0	$ 41.0
Office Space Value Added	323.0	137.0	60.0	155.0
Retail Space Value Added	35.0	18.0	7.0	17.0
Light Industrial Space Value Added	23.0	7.0	7.0	31.0
Commercial Entertainment Space Value Added	11.0	12.0	---	---
Housing Value Added	3.0	34.0	53.2	0
Other Taxable Uses Value Added	22.0	---	---	269.0
TOTAL FULL VALUE ADDED	$435.0	$225.0	$134.0	$513.0
Assessed Valuation Added (25%)	109.0	56.0	34.0	128.0
Annual Estimated Property Tax Revenues at $12/$100 A.V. at Full Redevelopment*	$ 11.7	$ 5.4	$ 2.7	$ NA**

*Growth in assessed valuation less $11.3 million in baseline valuation x estimated tax rate formula.
**Not a realistic basis for tax increment purposes. Refer to text discussion.

SOURCE: Lord & LeBlanc

adjustments to construction costs for each use have been made to reflect expected levels of assessment after occupancy.

The impact of additional public use such as the public park in Alternative C is indicated: assessed valuation added over the $11.3 base totals some $20 million; in Alternative A the growth is nearer $100 million. The assessed valuation added in the Redevelopment Agency tentative proposal would be intermediate between that of Alternatives A and B if housing and parking components were incorporated into the plan. If the recreation/entertainment park were also constructed and the hotel moved to CB-1, the added assessed valuation would be approximately the same as that of Alternative B.

The annual estimated property taxes from full development are presented only as an illustration of the relative production of "increments" for each alternative, basd on 1977 values and a generalized tax rate level. In actuality, values would tend to rise over time as inflation raises construction costs and land values, but the real dollar increase is not predictable. The use of these revenues for tax allocation bonds is governed by the rate of development and the types added in the early years of redevelopment of the entire YBC area. Therefore, the figures in Table 44 represent an order of magnitude estimate of the value added through an alternative in terms of a general capacity to use the tax allocation bond financing technique. Section VI.D.4 which follows discusses the limits to the use of such bonds for YBC.

4. RELATION OF REDEVELOPMENT AREA FINANCING TO OVERALL CITY FISCAL STRUCTURE

A financing impact may arise either from using public funds on hand, or from using public credit to raise additional funds under any of the four plan alternatives.

a. Financing The Convention Center.

The convention center is included in Alternatives A and B and in the Redevelopment Agency tentative proposal. With allowances for inflation and contingencies, project costs[28] consist of:

Land purchase	$ 6,700,000
Construction	81,300,000
Design and administration	12,000,000
Total Estimated Cost	$100,000,000

Construction is planned for the period of February 1979 through July 1981. The date of the bond sale has not been set.[29] The general plan of financing is as follows:

Convention center funds on hand[30]	$ 4,500,000
Hotel tax allocation 7/1/77-6/30/78	3,900,000
Hotel tax allocation 7/1/78-12/31/81	31,700,000
Required net bond proceeds	59,900,000
Total Estimated Cost	$100,000,000

Hotel tax allocations have been estimated on the basis of a 1977-78 total of $12,000,000 and a subsequent 6% annual increase in hotel room charges. For the 1977-78 year a tax rate of 6 cents per dollar has been used, with 2 cents less $100,000 allocated to the convention center.[31] For later years, an 8 cent per dollar tax rate has been used, with 4 cents less $100,000 allocated to the convention center.[32]

To provide the required net bond proceeds the Redevelopment Agency would issue $78,500,000 of bonds.[33] In addition to paying $59,900,000 toward project costs, bond proceeds would pay interest on the bonds for three years at up to 7.5% a year, and create a bond payment

reserve equal to one year's debt service. Beginning in 1981-82, the City would have to pay about $7,200,000 a year in rent for 27 years.

By their approval of Proposition S in November 1976, San Francisco voters authorized use of lease revenue bonds, and the Board of Supervisors confirmed the authorization by Resolution No. 186-77 on March 14, 1977. The amount of bonds appears to be limited to the amount which would be marketable on the basis of half of an 8% hotel room tax.[34]

To sell a $78,500,000 issue in December 1978, the Redevelopment Agency would have to show that hotel tax allocations could pay the annual rent. The proof would normally take two forms:

1) that hotel tax allocations had already reached an annual rate of $6,900,000, plus about $300,000 for insurance costs; and

2) that hotel tax allocations would reach 1.30 x $7,200,000, or $9,400,000 a year by 1981-82. This is the first year in which funds would have to be set aside from hotel tax revenues to pay rent.

Under the assumptions previously stated, hotel tax allocations would rise to an annual rate of $8,380,000 if the tax rate were raised to 8 cents per dollar in July 1978, and to $10,000,000 a year by 1981-82. These allocations could support a bond issue of about $85,000,000.[35] Bonds would be marketed on the basis of a City general fund obligation not to exceed the hotel taxes allocated to the convention center by ordinance.[36]

These conclusions are similar to those of the City's financing consultants,[37] although this analysis uses different standards of judgment about how the convention center bond issue might be designed and marketed. It appears that hotel tax equivalents, demonstrable at the time that bonds are to be offered, should support the $73 million bond issue needed to supplement other convention center funds. It also appears that if convention center costs should rise above $100 million, it would be difficult to market the necessary bonds as part of the initial issue.

If interest rates exceed those used in the calculations, more hotel taxes would be needed to pay bond service. There may prove to be more

hotel tax revenues than used in this analysis, because the 6% annual growth assumed is below actual experience in recent years. This analysis does not allow for a sharp economic reinflation. Reinflation of prices could simultaneously raise construction costs, increase interest costs and, if sparked by fuel costs, possibly restrain convention travel.

Sale of lease revenue bonds in the amount of $72.5 million would not impinge on the legal authority of the City to issue debt of any other kind, because the rental obligation incurred is a year-to-year rather than a long-term obligation.[38] Lease-revenue bonds are reported in the City's statement of direct and overlapping bonded debt. This statement summarizes the total of all long-term debt payable by state and local agencies to the extent that: 1) it is secured by the power to levy taxes on property within the City and 2) it is not, in fact, paid by water, sewer or other kinds of service charges. The statement is included in all bond offerings,[39] and is a standard reference statistic in bond credit analysis.

Neither the dollar amount of bonds nor its relationship to assessed valuation is itself a measure of ability to pay. If the convention center were perceived by bond buyers and analysts as a positive economic force, the bonds would not increase the cost of City borrowing for other purposes.[40] Credit impact would hinge not on the issuance of the bonds, but on the economic success of the convention center development.

b. Financing the Concourse and other Public Areas

Each of the alternatives calls for concourse, street, or pedestrian facilities intended to link YBC to Market St., open access to BART, and ease circulation within the area.

The following costs, in millions of 1977 dollars, have been supplied by the Redevelopment Agency, and, although noted elsewhere, are repeated here for convenience.

	ALTERNATIVES			
	A	B	C	D
BART access	$ 1.0	$1.0	$1.0	$1.0
Concourse & bridges	4.0	3.0	1.0	--
Street improvement	0.5	0.5	0.5	0.5
Land purchase	5.3	3.6	--	--
All Public Areas	$10.8	$8.1	$2.5	$1.5

The Redevelopment Agency tentative proposal costs would be the same as in Alternative A if the hotel and office uses were built in CB-2 and a public park were constructed on top of the convention center. The costs would be the same as in Alternative B if a recreation/entertainment park were constructed in the central blocks.

In addition to the above public areas, Alternative C provides for a two-block park with 1977 costs of $9.1 million for development and $15.4 million for land. Unless paid for from grants, the park would probably have to be financed through City general obligation bonds. The bonds would equal the park cost of $24.5 million plus about $0.1 million for election and bond issuance costs. Other forms of financing appear infeasible. The park would not produce substantial revenues from users, so it would not support a revenue bond issue. The park would not stimulate large increments of taxable development in YBC from which tax allocation bonds could be paid.

The public areas for circulation and access improvements lend themselves to different financing approaches under the different alternatives. Under Alternatives A and B and the Redevelopment Agency tentative proposal, the public areas relate closely to stimulating taxable development and use of the convention center. Tax allocation financing would be the usual way to pay for facilities which directly stimulate business and development in the immediate area. Under Alternative C the

public areas relate most nearly to the two-block public park and would probably be added to the park bond proposal, bringing the bond amount to $27.1 million. Under Alternative D the public improvements would likely consist of completing BART access, financed by the Redevelopment Agency from land sale proceeds, and street improvements, paid by developers directly or through assessment district bonds.[41]

The sale of tax allocation bonds for public areas under Alternatives A and B depends on the amount of taxable valuation, and the rate of its development. Table 45 presents an assumed build-up of taxable value based upon: (a) a development schedule provided by the Redevelopment Agency, (b) total land sales apportioned to the year of construction, and (c) the assumption[42] that valuations would appear on the tax roll for the fiscal year following the year of development.

For purposes of analysis, it is assumed that the public areas would have to be financed no later than October 1, 1979 and bonds marketed on the basis of taxable[43] evaluations assessed by March 1, 1979. To finance the $10.8 million for public areas in Alternative A, a tax allocation of $900,000 a year would be needed. To produce this revenue, at an assumed rate of $12 per $100 of assessed valuation, there would have to be at least $7.5 million of taxable valuation above the frozen base. At market rates, this translates into $30.0 million or more of new development and land value after the valuation date on which the tax base was frozen.

Although the Redevelopment Agency did not act to freeze the base immediately after adopting the original redevelopment plan for YBC, the Agency believes that later actions have frozen the base at the 1967-68 level of $11.3 million. The 1976-77 tax roll shows that about $3.8[44] million has since been added through construction and appreciation, bringing the tax base to $15.1 million.

Further values would be added under the various alternatives. Table 45 shows the growth estimated for Alternatives A, B, and C. The estimates are based on a schedule of land sales and private development provided by the Redevelopment Agency, and assume that new value would

TABLE 45

ESTIMATED ASSESSED VALUATIONS*, YBC (millions of 1977 dollars)

Fiscal Year	Plan Alternatives A	B	C
1977**	$ 15.1	$15.1	$15.1
1978	15.1	15.2	15.1
1979	15.1	15.2	15.1
1980	18.3	18.0	16.7
1981	19.2	18.5	17.3
1982	61.9	38.7	24.9
1983	75.2	41.4	31.7
1984	83.8	50.8	35.5
1985	91.1	56.1	42.9
1986	104.7	62.6	45.6
1987	115.3	70.6	46.5
1988	124.0	70.6	48.1
1989	125.2	70.6	48.1

*All valuations are assumed to appear on the tax roll one year after development buildout schedule provided by SFRA.
**Excludes certain improvements and unsecured property for Pacific Telephone Company and AT & T.

SOURCE: Yerba Buena Redevelopment Area 1976-77 assessed valuation of $9.3 million, SFRA; Pacific Telephone Company and AT&T assessed valuation of $5.8 million, Board of Equalization, Sacramento, California.

appear on the tax roll for the year following the new investment. To be on the 1979-80 tax roll, the value would have to have been in place on the March 1, 1979 assessment date.

The value then in place for Alternative A ($18.3 million) would be short of the $18.8 million needed to support the sale of tax allocation bonds for public areas. The value-in-place for Alternative B ($18.0 million) would suffice to finance the lesser amount of tax allocation bonds needed for that Alternative. (The Redevelopment Agency tentative proposal would be similar to Alternative A if central block development occurred as in A; it would be similar to Alternative B if a recreation/

entertainment park were planned for the central blocks.) The value-in-place for Alternative C ($16.7 million) would be short of the $16.8 million needed. These estimates[45] are uncertain. The tax roll is sensitive to how much land is sold for taxable development, when it is sold, and at what price it is sold. Actual results could differ from the estimates, perhaps substantially.

Failure to finance and build public areas early might impair access to the convention center and retard development by private financing. If the public areas could not be financed on schedule by tax allocation bonds, their absence or delay in construction might undermine the economic value of the convention center and impede private improvements.

Without tax allocation financing, Alternative C appears to require a $27.1 million general obligation bond issue. Before setting the size of the issue to be voted upon, the City would probably negotiate a firm price for the land, and compare and price alternative designs. Then about four months would be needed to inform voters and carry out the election process. Assuming a successful vote on the November 1978 ballot, bonds would be marketable in January 1979, design would begin, and construction follow in the fall and winter.

Bond service would first become payable from taxes levied for the 1979-80 fiscal year. A citywide tax rate of $0.06 per $100 would be required in the first year. In later years bond service would remain at about $2.0 million a year; but the required tax rate would decline as assessed valuation continues to rise. These estimates[46] are preliminary and are in 1977 dollars. Bond service calculations assume 25-year, 5.5% bonds. The tax rate was estimated using a tax rate of $12 per $100 assessed valuation.

The largest source of error in these calculations is likely to be in the base year cost assigned to land and to park development. Both bond issue size and bond service would rise or fall in proportion to park cost in 1977 dollars. Inflation would further increase the bond issue size, but have little effect on the required tax rate, because inflation would

simultaneously raise the tax base. Neither the bond issue itself, nor the tax rate required, would have a discernible effect upon the creditworthiness of the City. However, the bond issue would reduce the City's available capacity to issue long-term bonded indebtedness by the amount of park bonds outstanding. Based on the 1977-78 assessed valuation of $3,571 million, bonded indebtedness cannot exceed $428.5 million. Charter Section 6.401(a) limits bonded indebtedness to 12% of assessed valuation of all real and personal property in the City subject to taxation for City purposes. As of February 11, 1976, the City's bonded indebtedness was about $251 million.[47]

In the absence of change in state law governing property tax assessment practices, assessed valuation will rise if inflation continues and development proceeds. Concurrently, bonded debt will decline as bonds are paid. Typically, assessed valuation would be expected to rise at least 8% a year, while principal payments on bonds average about 4% a year. The two trends would increase bonding capacity about 12%, or $44.3 million, a year. In effect the park bonds would consume less than eight months growth in bonding capacity.

In financing terms, the larger impact would be that taxable valuation would be foregone by withholding two downtown blocks from the tax roll, and by encouraging the development of predominantly low tax-valuated and tax-exempt uses around the park.

Because Alternative C involves a two-block park which would have to be financed from voted bonds (absent grants or contributions), failure to win a two-thirds approving vote would have another possible impact. Alternative C would have to be amended, or the two-block area would probably remain as it is, about half vacant and half used for temporary parking. Such land uses would be expected to diminish the market for market-rate housing, increase financial risk for subsidized housing, and retard the rate of development of office, retail, and light industrial uses.

c. Financing Subsidized Housing

In November 1976, City voters approved two propositions which affect subsidized housing. Proposition P prohibits or limits the City's use of nonvoted lease revenue bonds to finance housing, while Proposition Q authorized private sponsors, with public financial assistance, to develop up to 3,000 units of low-rent housing within the City. The text of Proposition P[48] does not list the projects exempt from the voting requirement.[49]

Nothing in any of the settlement agreements relating to YBC appears to provide for issuance of lease revenue bonds for low-rent housing by the City, and consequently, Proposition P would probably apply. The August 28, 1974 agreement settling the Duskin, Williams, and All Persons actions acknowledges the priority of the TOOR settlement agreement, but in no way, itself, directs that subsidized housing be provided or financed. It does provide for the addition of 900 units of market-rate housing as a permitted use, but does not provide for any financial sponsorship or aid by the City or the Redevelopment Agency. The April 15, 1975 amendment to the settlement agreement deals with subsidized housing to the extent of authorizing the release of appropriated hotel tax revenues to TOOR or TODCO for an initial project. It does not embrace low-rent housing within the uses for which lease revenue bonds were to be sold.

The May 15, 1973 TOOR agreement is an agreement between TOOR and the San Francisco Redevelopment Agency, and does not obligate the City. Assuming that the City has taken all action on its part anticipated in the TOOR agreement, then there appear to exist: (1) ordinances which allocate hotel taxes to provide "...for rent supplements for low-income housing..."; and (2) a service agreement[50] between the City and TODCO to manage the planning, design, and financial planning services.

Each of the plan alternatives calls for construction of subsidized housing. The plans differ in the number and classification of units as follows:

Subsidized Housing Type	Alt.A	Units of Housing Alt.B	Alt.C	Alt.D
Elderly and handicapped	602	602	602	602
Family	--	300	300	--
	602	902	902	602

In addition to the 602 units of housing for the elderly and handicapped, the Redevelopment Agency tentative proposal could provide some limited amount of subsidized family housing. It is unlikely that more would be provided in this tentative proposal than is described in Alternatives B and C.

In addition, Plans A, B, and C and the Redevelopment Agency tentative proposal call for market-rate housing, which does not involve public subsidy except for that involved in making sites available at less than the cost of purchase and clearance. No public financing is required.

The more probable method of financing subsidized housing is through federal, state, or local mortgage guarantees. A number of programs[51] exist under which such guarantees could be sought from HUD, the California Housing Finance Agency (CHFA), or the San Francisco Housing Authority.

At the state level CHFA has been authorized to issue up to $450 million in revenue bonds[52] for financing housing development.[53] It appears that Proposition Q was drafted in substantially the language of Article XXXIV of the State constitution, to supply the voter approval required in the CHFA vs. Elliott decision.[54] Proposition Q may also suffice to supply voter approval for assistance by the San Francisco Housing Authority or by the Redevelopment Agency.

Residential property used exclusively for housing and related facilities for elderly or handicapped families may fall within the welfare

exemption from property taxes. Certain federally financed housing under non-profit sponsorship is granted an exemption under state law.[55]

No studies have come to light which indicate how many units of what kind might be financed, or on what schedule. However, as long as the City does not issue bonds to finance housing, no direct financing impact is foreseeable.

To the extent that housing qualifies for property tax exemption, there would be a loss of possible tax revenues. For example, if the full value of land and improvements devoted to a family unit were $50,000, the foregone tax revenue would be no more than $1,500[56] a year per unit. Since this taxable valuation is not now on the tax roll because the land is owned by the Redevelopment Agency, continued tax exemption would not affect the City's present financial posture.

d. <u>Financing Off-Street Parking</u>

For purposes of this analysis, all public off-street parking in Alternatives A and B and the Redevelopment Agency November 1977 tentative proposal is assumed to be publicly sponsored. Some, in fact, would probably be provided as part of private development or through in-lieu payments by private developers.

In Alternative A there are 1,260 public off-street parking spaces and 1,250 spaces are included in Alternative B. The Redevelopment Agency tentative proposal includes a possible 1,750 off-street public parking spaces. In Alternatives C and D no publicly sponsored parking is proposed.

Proposition P requires voter approval for parking revenue bonds whether issued by the City directly or by the San Francisco Parking Authority with the approval of the Board of Supervisors. Prospects for voter approval of such bonds are uncertain.

Sale of true revenue bonds, that is, bonds secured solely and exclusively from parking facility revenues, would not have an impact upon

City credit because the bonds would involve no pledge of the City general fund, nor any possibility of support from the general fund.

Bonds payable from the general fund could take two forms: (1) lease-revenue bonds or (2) parking authority bonds to which revenues from parking meters, and possibly other parking authority garages, would be pledged to supplement revenues from YBC garages. Lease revenue bonds involve a general fund pledge to pay rent sufficient to retire the bonds, whether or not net revenues from the garage are sufficient. Authority bonds secured in common with bonds for previous garages, together with a pledge of on-street meter revenues, represent a possible diversion of money from the general fund. Both of these forms of revenue bond require voter consent.

If such bonds were voted and issued, the impact would depend upon the rate at which bonds were sold and garages built. The parking charges and concession revenues needed to pay for multistory garages, and to operate them, would be greater than the charges and revenues prevailing at the present temporary parking lots. Intensive usage of the present lots does not ensure equal usage of higher cost parking garages where parking fees would have to be two to four times larger than for lots.

However, if the garages were built in increments which match demonstrable need, the garages would be self-supporting, and the City's pledge of general fund or surplus meter revenues would have no predictable impact. On the other hand, failure to vote parking bonds could retard development of retail, office, and commercial space and possibly diminish usage of the convention center.

e. <u>HUD Loan Repayment</u>

The existing HUD loan is an obligation of the Redevelopment Agency, not a debt of the City. Repayment is likely to be from land sales proceeds unless other arrangements are made. Loan repayment would itself have no impact on City finances. However, the sale of land for

taxable uses would increase the City tax roll and create an opportunity for further growth in tax revenue as the land would be improved.

FOOTNOTES

[1]Urban Land Institute, 1975, Dollars & Cents of Shopping Centers.

[2]San Francisco Department of City Planning, Housing Information Series, Tables 14 to 18, September 1977 (the publication does not have numbered pages). The cited source is the Bureau of Building Inspection records. From 1968 to 1976 there were 14,972 housing units completed in San Francisco, or an average of 1,872 units per year. During the same time period, there were 6,521 residential demolitions, or an average of 815 units removed from the housing stock each year. On this basis, there were 1,057 net additions to the residential inventory on an average annual basis, or a net total of 8,456 units over this eight-year period. During the same eight-year period, the South-of-Market Planning District experienced 306 completions and 382 demolitions, or a net less of 76 units, for an average net loss of 9.5 units per year.

[3]YBC Commercial Development Study Team, June 1976, YBC Commercial Development: Options for Light Industry. "Incubator" industries are new industries developing new technologies or products.

[4]Arthur D. Little, Inc., and URS Research Company, 1973, Yerba Buena Center Public Facilities and Private Development, Draft Environmental Impact Report, City and County of San Francisco, pp. V-A-84/85.

[5]R. Gryziec, July 26, 1977, Memorandum. Available at Department of City Planning.

[6]P. Collins, CAO office, Letter, November 1977.

[7]R. Gryziec, July 26, 1977, Memorandum, pp. 4-5, and September, 1977, Memorandum. Available at Department of City Planning.

[8]Mayor's Select Committee, 1976, Commercial Development Team Report.

[9]See Employment Section VI.D-2 following.

[10]S. Smith, Secretary Treasurer, San Francisco Building Trades Council, telephone communication, August 12, 1977.

[11]C. Hayes, Affirmative Action Coordinator, Office of Yerba Buena Convention Center, interview, November 10, 1977.

[12]L. Brasted, Senior Business Representative, Office and Professional Employees International Local #3, telephone communication, August 12, 1977.

[13]2.5% x projected minimum new office employment (4990) in 1988, see Table 34.

[14]2.5% x projected maximum new office employment (25,410) in 1988, see Table 34.

[15]M. Blaustein, Business Representative, Retail Clerk's Union Local #410, telephone communication, September 2, 1977.

[16]95% x projected minimum new retail employment (170) in 1988; see Table 34.

[17]95% x projected maximum new retail employment (6,140) (including 30% of Alternative D downtown support) in 1988; see Table 34.

[18]R. Parr, Secretary-Treasurer, Building Service Employees Union, Local 87, telephone communication, November 21, 1977.

[19]Western Addition, Diamond Heights, Yerba Buena Center, Golden Gateway, Hunters Point, India Basin, Stockton-Sacramento.

[20]The Redevelopment Agency staff suggests that the market absorption of overall development by 1988 would not exceed approximately one-half of the potential under this alternative.

[21]Subject to limits described in Section VI.D.4.

[22]Estimates from the San Francisco Redevelopment Agency, T. Conrad, based on estimates from the Recreation and Park Department.

[23]See Section VI.E.

[24]The San Francisco Board of Supervisors has been holding hearings on variations in these locally imposed revenue sources. At this writing, these rates are in effect. The rates could be modified on an annual basis.

[25]Economic Research Associates, 1969, Market Analysis, Central Block YBC, Los Angeles; Development Research Associates, 1970, Economic Performance of Public Facilities in YBC, Los Angeles; and Rosenstein, A. and D. Fulton, 1973, Critique of Yerba Buena Center.

[26]State of California Health & Safety Code, Section 33670 ff. is the underlying authority.

[27]San Francisco Redevelopment Agency, T. Conrad, interview, September 1977.

[28]Reported by R. Boas, Chief Administrative Officer, November 21, 1977.

[29]Letter of Blyth Eastman Dillon & Co. to R. Boas, August 17, 1977.

[30]A. Sekara, Assistant Controller, ledger balance 6/30/77 of $4,505,804.

[31]Estimate by Bartle Wells Associates based on 1977/78 hotel tax revenues of $12,000,000.

[32]Estimate by Bartle Wells Associates.

[33]Estimate by Bartle Wells Associates.

[34]The text of Proposition S says "...using a 4 percent hotel room tax to finance lease revenue bonds, ..." The accompanying "Controller's Statement on S" adds that convention center "...costs will be financed by an increase in the hotel room tax rate from 6 percent to 8 percent."

[35]Estimate and analysis by Bartle Wells Associates.

[36]Recommendation of Orrick, Herrington, Rowley & Sutcliffe, bond counsel, interview, August 18, 1977.

[37]Letter of Blyth Eastman Dillion & Co. to R. Boas, August 17, 1977.

[38]City of Los Angeles v. Offner (1942) 19 Cal. 2nd 483, and related decisions.

[39]As an example, see the Official Statement of January 22, 1976, City of San Francisco Social Services Corporation, page 21.

[40]Based on analyses of the impact of Bay Area Rapid Transit District bonds on borrowing costs for public agencies in the three-county BART area. Technical Memorandum for Metropolitan Transportation Commission by MacDonald & Grefe, with Bartle Wells Associates, August, 1977. Document No. DOT-BIP-TM-27-7-77.

[41]No specific plans for financing any of the public areas have been established by the City or SFRA. The financing methods suggested here represent judgments by Bartle Wells Associates based on their experience as municipal financing consultants to agencies other than the City or SFRA.

[42]By Bartle Wells Associates.

[43]Certain kinds of land and improvements are assessed, but not subject to taxation because they fall within the welfare exemption of the State Constitution (Article XIII, Sec. 3(e), 3(f), and 4(b)). Only the valuation actually subject to property taxation, or equivalent State subventions, contributes toward payment of tax allocation bonds.

[44]Estimate by Bartle Wells Associates based on discussions with San Francisco Redevelopment Agency and State Board of Equalization.

[45]By Bartle Wells Associates based on data supplied by San Francisco Redevelopment Agency.

[46]By Bartle Wells Associates.

[47]Estimate by Bartle Wells Associates based upon the Statement of Direct and Overlapping Bonded Debt compiled by California Municipal Statistics, Inc. for City of San Francisco Social Services Corp.

[48]Now incorporated as Charter Sections 2.304, 7.300, 7.306, 7.308, and 7.309.

[49]In the words of the Charter Amendment, projects are exempt if: (a) the ". . . bonds (were) approved by the Board of Supervisors prior to January 1, 1977" or if (b) ". . . lease financing . . . was approved in fact or in principle by a resolution or ordinance adopted by the Board of Supervisors prior to April 1, 1977; provided that if the resolution or ordinance approved the lease financing only in principle, the resolution or ordinance must describe in general terms the public improvements or equipment to be financed . . ."

[50]Exhibit C of TOOR Settlement Agreement.

[51]Housing Subsidy Programs: Low/Moderate Income, Elderly, Handicapped. The housing subsidy programs listed below are all HUD sponsored. The programs fall in three categories: (1) mortgage guarantee programs, (2) rental supplement programs, or (3) a combination of the first two.

A. Mortgage Guarantee Programs:
1. Mortgage insurance - rental housing
2. Mortgage insurance - rental housing for moderate income families.
3. Mortgage insurance - rental housing in urban renewal areas.

B. Rental Supplement Programs:
1. Rental supplements - rental housing for lower income families. (Assistance covers the difference between the tenant's payment and the market rental, but may not exceed 70 percent of the market rental).
2. Lower income housing assistance program (Section 8 Housing Assistance Program). Provides annual assistance payments to make up the difference between the established maximum rent paid to owners of the dwelling unit and the renters' required contribution towards rent.

C. Mortgage Guarantee/Rental Supplement Programs:
1. Interest reduction payment - rental and cooperative housing for lower income families. (Elderly and handicapped are also eligible. Public bodies do not qualify as mortgagors under this program.)
2. Mortgage insurance - rental housing for low and moderate income families, market interest rate. (Low income families are eligible for rent supplement benefits when the mortgagor has qualified for this insurance.)
3. Mortgage insurance - rental housing for the elderly. (Nonprofit sponsors are eligible for rent supplements; however, no new applications for rent supplement have been accepted since June 1974.)

[52]California Health & Safety Code, Section 41700 (c).

[53]As defined in Health & Safety Code, Section 41701.

[54]131 Cal. Rptr. 361 (1976).

[55]California Revenue & Taxation Code, Section 214 (7).

[56]Estimate by Bartle Wells Associates, using a tax rate of $12 per $100 assessed valuation.

E. COMMUNITY SERVICES

1. WATER

The temporary 20-inch diameter steel main, which is detoured to the south of Howard St. in CB-3, would have to be replaced under Howard St. by a permanent 30-inch diameter steel feeder main; under the no-action variation of Alternative D, the replacement might be delayed indefinitely. Because the temporary main is more fragile than a permanent one, the temporary main would have to be replaced before any excavations could be done at the north end of the block, if conventional excavation techniques were used in YBC development in CB-3.[1]

Water lines are removed or separated from the main lines and capped when a street (such as Minna or Natoma St. in CB-2) is abandoned. All other remaining mains are located beneath city streets; no further relocations would be necessary. The six-inch main serving the center of SB-2 might have to be replaced with an eight-inch main to provide an adequate water supply to the TODCO housing development proposed for the site under all the alternatives. This cannot be determined until architectural plans and Fire Department requirements are prepared for the building.[1]

2. SEWERS AND SEWERAGE

Relocation of the eight-foot-diameter North Point main was completed in 1972 to accommodate the earlier two-block design for the convention center. No other city sewer mains would have to be constructed or relocated to serve the alternatives proposed for YBC.[2] See Appendix E-2a for locations of mains.

The sewer currently existing under a section of the proposed pedestrian concourse on CB-1 would not have to be removed unless built over in Alternative D. The sewers that lie in CB-2 in what were Minna

and Natoma Sts. would have to be abandoned or removed, if buildings were to be constructed over them as in Alternatives A and D, but they might be used by the recreation/entertainment park in Alternative B.

In CB-3, sewers exist under what were Tehama and Clementina Sts. These would be removed during the excavation for the convention center in Alternatives A and B and would have to be removed or abandoned during construction in that block in Alternative D. All other mains are under the streets.[2]

Sewage

It is assumed for purposes of estimation that 100% of YBC water consumption, other than that used for irrigation of park and concourse landscaping, would be discharged into the sewers as liquid waste.[2]

1980. The YBC area currently produces 0.124 million gallons of liquid wastes per day (mgd). This is 0.12% of the citywide average daily sewage production of 102.2 mgd. By 1980, after completion of the buildings now under construction and those committed for construction (refer to Appendix E-2b), the area would contribute an estimated 0.229 mgd, or 0.22% of the city's average dry-weather flow, under Alternatives A and B and the Redevelopment Agency tentative proposal with the convention center, and approximately 0.215 mgd, or 0.21%, under Alternatives C and D (Table 46). During construction of the convention center, the site would be dewatered from the present level of the water table at -2 feet[3] to a level of -25 to -30 feet and the water would be discharged into the combined storm drain/sewer system.[4] Dewatering would continue for approximately two years, at which time the water level would again be allowed to rise to the -2 foot level. A pump would be used to keep the water table from rising above this level for the life of the building.[5] Disposition of pumped water has not been determined.

Until the Southeast Water Pollution Control Plant expansion is finished in mid-1982, YBC sewage would receive primary treatment at the

North Point Water Pollution Control Plant. By 1980, no alternative, including existing and committed uses, would produce more than 0.39% of the average daily dry weather flow of the North Point Plant; with this addition, the total dry-weather flow would remain within the plant's effective dry-weather design capacity. Any development would add to the Plant's overflow problem during wet weather. This impact would continue until operation of the expanded Southeast Plant begins in 1982.

1988. By completion of development in 1988, all dry-weather flows from YBC would receive secondary treatment at the expanded Southeast Water Pollution Control Plant, in compliance with the San Francisco Wastewater Management Program; the North Point Plant may have been converted to an interim wet-weather facility. Generally, sewage from the area north of Howard St. in YBC would be routed through the North Point Pumping Station, the Channel Street Transport/Storage System and via the Channel Pumping Station and Crosstown Force Main to the Southeast Plant. Sewage from south of Howard St. would go directly to the expanded plant via the Channel Pumping Station and Crosstown Force Main which will go into operation when the expanded Southeast Plant is put on line.[6] The expanded Southeast Water Pollution Control Plant is expected to receive average dry-weather flows of 85 mgd.[7] None of the dry-weather flows generated under any alternative would be expected to tax the capacity of the expanded plant, which will have a peak capacity of 140 mgd and additional shock capacity in the transport/storage system.[7]

Alternative A. The average daily sewage flow under this alternative would almost equal that of Alternative D (see Table 46). Refer to Appendix E-2c for discretionary use sewage generation calculations. However, higher peak flows relative to average flows would be expected than in Alternatives C and D, due to the intermittent intensity of convention use. Should the convention center not be built under this alternative, peak flows would be similar to, though less than, those in Alternative D. The Redevelopment Agency November 1977 tentative proposal without a recreation/entertainment park would have impacts similar to those of Alternative A.

TABLE 46

AVERAGE DAILY DRY-WEATHER SEWAGE FLOWS (MGD) PRODUCED BY YBC

1980 ALTERNATIVE	EXISTING USES* (MGD)	COMMITTED USES (MGD)	DISCRETIONARY USES (MGD)	DISCRETIONARY USE SEWAGE PRODUCTION AS A % OF TOTAL S.F. SEWAGE	TOTAL USES (MGD)	TOTAL SEWAGE PRODUCTION AS A % OF TOTAL S.F. SEWAGE**
A	0.171	0.044	0.014	0.013	0.229	0.22
B	0.171	0.044	0.014	0.013	0.229	0.22
C	0.171	0.044	---	---	0.215	0.21
D	0.171	0.044	---	---	0.215	0.21

1988 Alternative	Existing Uses(mgd)	Committed Uses(mgd)	Discretionary Uses(mgd)	Discretionary Use Sewage Production as a % of:		Total Sewage(mgd)	Total Sewage Production as a % of:	
				Total S.F. Sewage***	S.E. Plant+		Total S.F. Sewage***	S.E. Plant+
A	0.17	0.07	1.24	1.21	1.46	1.48	1.45	1.74
B	0.17	0.07	0.74	0.72	0.87	0.98	0.96	1.16
C	0.17	0.07	0.49	0.48	0.58	0.73	0.71	0.87
D	0.17	0.07	1.29	1.26	1.52	1.53	1.50	1.80

*Buildings now under construction are included.
**No sewage from YBC is currently being treated at the Southeast Plant and none would be treated there in 1980.
***Total annual San Francisco sewage production was 37 billion gallons (102.2 mgd) in 1975/76, according to figures supplied by Arthur Brandow, Administrative Engineer, Bureau of Engineering, personal interview, July 15, 1977.
+Estimated average dry-weather flows at the Southeast Water Pollution Control Plant would be 85 mgd. This is based on a 5% increase in the combined current dry-weather flows of the North Point and Southeast Plants. Little increase in the amount of sewage generated in San Francisco is expected by 1988 (D. Birrer, Senior Civil Engineer, Wastewater Flow Control Division, Bureau of Sanitary Engineering, personal interview, August 29, 1977).

Alternative B. Weekend peaks under this Alternative would be higher than those in Alternative A when weekend recreation/entertainment park use coincides with use of the convention center. There would be a decrease in wet-weather runoff due to absorption of rain by the landscaped areas of the recreation/entertainment park in CB-2 and CB-3. This would alleviate some of the shock loads on the storm drain system during rain storms. Enlargement of the recreation/entertainment park by moving the proposed apparel mart to the east side of Third St., or replacement of the recreation/entertainment park by a conventional public park, would enhance this effect, because a lesser square footage would be covered by buildings and other impervious surfaces. If the Redevelopment Agency tentative proposal included a recreation/entertainment park, it would have sewage flows similar to those of Alternative B.

Alternative C. This Alternative would generate the lowest discharge of liquid wastes due to the absence of development in the park on CB-2 and CB-3[8] and the lower density of development elsewhere. The absorption of rain by the park soils would reduce and slow the runoff into the storm drains during wet weather, as 80 to 90% of the moisture falling on the two central blocks would be absorbed.[9]

Alternative D. Alternative D would produce the greatest average sewage flow. Peak flows would be lower than in A. Because of the absence of any block-size landscaped or park area, storm runoff would be higher than in Alternatives A, B, or C.

3. ELECTRICITY AND GAS

In 1972-73, Pacific Gas and Electric Company (PG&E) rerouted the electric and gas lines which were under Howard St.; no further relocations are anticipated unless an underground building level should be extended beneath a street.[10] As YBC is an "underground district", the aerial power lines on Clara, Shipley and Clementina Sts. west of Fourth St. would have to be removed as soon as undergrounding work is scheduled by the City and County of San Francisco. Precedence for utility

undergrounding is given by the Department of Public Works to areas where redevelopment or street improvements would interrupt existing utility service; requests from a majority of the local private property owners are also considered in the order in which they are received.[11]

The capacity to serve the demand for electrical power under full development of each alternative exists in the PG&E system as a whole; the Mission Street Substation, which serves the YBC area, is now being used to capacity.[12] Further development under any alternative would require a transfer to the 136 MVA-capacity (MVA=million volt-amperes or million watts) Embarcadero Substation at 405 Folsom St. and expansion of its capacity to 600 MVA[13] at PG&E expense. Extension of the service network from the Embarcadero Substation into YBC would involve street disruption during the construction period.[10]

4. SOLID WASTE

Domestic Solid Wastes

1980. The convention center, buildings currently under construction, TODCO housing, and other buildings committed for completion by 1980 would add an estimated 1,630 tons of domestic solid wastes each year to the 1,830 tons being produced in the area at present. This addition would constitute approximately 0.27% of the San Francisco total annual domestic solid waste production of 599,000 tons projected for 1980.[14] The largest contributor would be the convention center and the landscaped area above it, which would produce about 1,000 tons, or 0.17% of the citywide total. This increase could be accommodated by the Mountain View landfill site in Santa Clara County.[15]

1988. At full development, Alternative A, including existing and committed uses, would produce approximately 3.3% of the 662,000 tons of domestic solid waste projected for San Francisco by 1990 in the San Francisco Solid Waste Management Plan.[16] The office space planned would produce 60% of the discretionary impact (see Table 47). Refer to Appendix E-3 for solid-waste generation calculations.

Forty-three percent of the discretionary impact under Alternative B by 1988 would be contributed by office space. The total solid waste would comprise 2.1% of the projected citywide tonnage.

The Redevelopment Agency tentative proposal without a recreation/entertainment park would produce an amount of solid waste intermediate between those of Alternatives A and B. If a recreation/entertainment park were included, the solid waste production would be more nearly like that of Alternative B.

Alternative C would generate the smallest amount of domestic solid waste; 1.3% of the citywide total would result from full development. Office and retail commercial uses would produce 42% of the discretionary impact. Development of a recreation/entertainment park, rather than a public park, would increase the discretionary impact by approximately 36%.

Alternative D, including existing and committed uses, would account for 3.9% of the citywide total by 1988. Downtown support services would contribute almost one-half of the discretionary impact. This alternative would have the greatest impact on solid-waste disposal site capacity.

The full development of YBC would occur after the expiration of the contract for use of the Mountain View landfill site; the site which would be in use at that time is not known. Securing disposal sites is a problem for San Francisco; the wastes generated by YBC, especially under Alternatives A and D, would be expected to shorten the life of the city landfill site.

Excavation Materials

Excavation materials from construction of the convention center would begin to be produced in 1978. An estimated 630,000 cubic yards would be removed, although 25% of this material would be put back into the foundations.[17] Some of the excavated soils, but no more than 50,000 cubic yards, could be used on top of the convention center for landscaping, if the soil were determined to be suitable by the landscape architect. The remaining 420,000 cubic yards of material would be hauled

TABLE 47

SOLID WASTE PRODUCTION (TONS PER YEAR) IN YBC: 1988

ALTERNATIVE	EXISTING AND UNDER CONSTRUCTION	COMMITTED USES	DISCRETIONARY USES	TOTAL	TOTAL AS A PERCENTAGE OF TOTAL S. F. SOLID WASTE* %
A	2,290	440	18,850	21,600	3.3
B	2,290	440	11,110	13,800	2.1
C	2,290	440	5,750	8,480	1.3
D	2,290	440	23,300	26,100	3.9

*Estimated San Francisco domestic solid-waste production in 1990 would be 662,000 tons per year, San Francisco Department of Public Works, 1975, San Francisco Solid Waste Management Plan.

away from the site to be dumped or sold as fill.[17] A private (not municipal) fill site would be used; final arrangements would be made by the excavating contractor. The East Bay Regional Park District has expressed an interest in obtaining this fill for three sites in the East Bay.[18]

It is not possible to estimate accurately the total quantities of excavation materials which would be produced by 1988 under each alternative without architectural plans which specify the extent of excavation on each building site.

The potential exists for spillage along the haul route. Each contractor would be responsible for the removal of any materials spilled. It is not anticipated that problems from spillage would occur generally along the haul routes; there could be some spillage in the area near each site where the trucks make a turn to get onto the street.[17]

Construction Debris

An estimated 25,000 cubic yards of construction debris, mostly from the finishing of the interior, would be produced by 1980 during the construction of the convention center.[19] A contractor would be hired to make arrangements for disposal of the debris in a private (not municipal) landfill.[20] All of the construction debris under the YBC alternatives would be handled in a similar manner.

5. COMMUNICATIONS

Effect on Telephone Service

Remaining aerial telephone facilities would be placed underground on Clementina, Shipley and Clara Sts. west of Fourth St. when so scheduled by the City.[21] All telephone lines installed in the future would be placed underground in City streets. The lines in the temporary detour on the south side of Howard St. between Third and Fourth Sts. would be

reestablished in Howard St. The Redevelopment Agency has requested that this work be completed as soon after January 1, 1978 as possible.[21] Pacific Telephone and Telegraph Company has stated that it would be able to provide service at any of the levels required by the Alternatives in 1980 and 1988.[21]

Effect on Courier and Delivery Services

By 1980 the convention center would place demands on the courier services. One courier service has stated that, through the expansion of staff and equipment, it would be able to serve YBC at all levels of development proposed for 1988.[22] As many of the messengers use bicycles, theft and accidents involving pedestrians and unattended bicycles might occur. Delivery trucks and vans could also cause congestion.

The impact of Alternative B would be less than that of Alternative A, as the recreation/entertainment park would require little service and the office and retail-commercial space would be reduced to two-thirds of that of Alternative A. The Redevelopment Agency tentative proposal would have impacts intermediate between those of Alternatives A and B if housing and public parking were added but the recreation/entertainment park were not added. If the recreation/entertainment park were also part of this proposal, the effects would be like those of Alternative B. Alternative C would need the smallest increase in messenger and delivery services, as it would have the least commercial and office development.

The impact of Alternative D would be heavier than that of Alternative A, but Alternative D would not have the peaks in demand characteristic of the convention center. Increased light industrial and downtown support development would require more delivery and less courier service.

Effect on the United States Postal Service

The Postal Service would continue to provide service to the Redevelopment Area under zip code areas 94103, 94105 and 94107. The

demands for mail delivery and pickup at any level of development under the proposed alternatives would be met as provided by law. Mail delivery would be possible from Postal Service mailrooms located within private buildings, subject to the discretion of the Postal Service and to compliance with the regulations governing such mailrooms.[23]

6. POLICE

Development in any form in the redevelopment area would have an effect on the types and frequencies of crimes which would occur there. The exact effect cannot be determined, since it would depend on detailed plans for design and construction of all components and the mix of people who would be using them. The rate of auto theft would be reduced by the elimination of most of the unattended parking lots now distributed throughout YBC. Construction sites under any alternative would be subject to vandalism of equipment and theft of tools and materials. Crimes against persons, such as strong-arm and armed robbery and aggravated assault, which are currently concentrated in the areas closest to Market and Sixth Sts., would be expected to decrease due to the increased pedestrian traffic and development of areas that are now vacant and are used as sleeping places by transients.[24] The rate of burglary and theft in offices, retail stores, and other businesses would depend on the internal security, such as alarm systems and security guards, provided in each building.

Alternative A. Proposed to be completed by 1980, the convention center itself would probably not require any additional police manpower due to its internal security measures and the convention center guard force (see Section VII.E.6). Pilferage and theft would be the major problems anticipated. According to the Chief of Security of the Los Angeles Convention Center[25], a facility similar in size to the one proposed for YBC, the Los Angeles Convention Center resulted in a lower rate of crime in the local area and no extra police officers were needed. A special police detail for pickpockets might be needed during heavy convention activity, however.[25]

The convention center park, if landscaped in an open manner for visibility, could be patrolled adequately by existing squad cars and would not be expected to attract a violent criminal element. Some activities now common in Union Square, such as panhandling, drug trafficking, and public drunkenness might occur in the park; a police task force, similar to the one patrolling Union Square, might be needed to control this. This task force could also be used to discourage solicitation for prostitution which might occur due to the proximity of the proposed hotel.[26] If the Redevelopment Agency tentative proposal included a conventional public park in CB-3, police patrol needs would be similar to those of Alternative A.

Some traffic control officers would be required when high convention center pedestrian traffic coincides with peak-hour vehicular traffic (see Section VI.F).

Alternative B. The effect of the convention center on police services is discussed under Alternative A above. The recreation/entertainment park would require less Police Department protection than the public park since an internal, private security force would patrol the grounds and would be responsible for security while the recreation/entertainment park was open. If the November 1977 Redevelopment Agency tentative proposal or a variant to Alternative A provided a recreation/entertainment park, police needs would be similar to those of Alternative B.

If the park were enclosed and an admission fee charged for entrance to the grounds, few crimes against persons would be expected because casual pedestrians would be excluded from the area after closing time. The buildings within the grounds, however, would be more vulnerable to burglary and vandalism since the police on patrol would not be able to see into the area.[24]

If the grounds of the recreation/entertainment park were not enclosed and an admission were charged only for specific buildings, areas, and entertainment events, pedestrians would be likely to cross through the area after closing time and would be potential victims. The park would be

more visible to City police patrolling in cars; burglaries of the buildings would be discouraged.[24]

Alternative C. Due to the increased housing and the two-block public park, Alternative C would have different impacts on police services. The amount of police service required for the housing developments would depend on the types of internal security systems provided in the buildings to discourage burglaries.

The public park would be expected to be used during the day by local employees. There would be no private security force. Some of the activities which characterize Union Square would be anticipated and would require police task force surveillance. If the park were landscaped and well lighted for visibility, it could be patrolled by the police cars now serving the area. Any dense landscaping where concealment would be possible would be hazardous, particularly to the many elderly residents of YBC. Benches might also be a police problem, as they provide a place for panhandlers, drug traffickers, drunks and prostitutes to congregate.[26]

Alternative D. Development under Alternative D would produce a situation similar to that existing in the area surrounding South Park which contains downtown support services, light industry, and residential development. The major problems would be expected to be thefts and burglaries and, as with the other alternatives, there would be a decrease in violent crimes.

7. FIRE

The fire protection requirements of each of the alternatives can be met by the San Francisco Fire Department without any increase in firemen, inspectors, or equipment, as the level of service now offered is consistent with full urban development.[27] No high-pressure lines,[28] operated by the Fire Department, would have to be relocated or replaced and none would have to be installed.[29]

Alternative A. Of particular concern to the Fire Department is the design of the convention center, which would not be completely covered by the provisions of the Building Code because of its below-grade location and use. Discussions are now proceeding between the architects of the center and the Fire Marshal as to the internal fire protection safeguards which would be incorporated into the design. These mitigating measures are discussed in Appendix E-4 and in Section VII.E. The final agreement would be submitted to the San Francisco Board of Examiners for approval. Containment of a fire in the convention center would not be a problem, but the special conditions of large crowds below-grade concern the Fire Department. The exact number of persons permitted in the building at one time has not yet been determined, but it would be approximately 27,000.[30] The Fire Department would like to ensure that the convention center and its staff would be self-sufficient with respect to fire protection for several hours in case of city-wide disaster or emergency conditions which might prevent immediate Fire Department response.

The site is protected externally by a 16-inch high-pressure water main circling the block on Fourth, Folsom and Third Sts. No alterations would be required. Other buildings planned for Alternative A would be protected by compliance with Building and Fire Code requirements.[30]

Alternative B. The effect of the convention center and other buildings would be the same as in Alternative A. The recreation/entertainment park would require adequate access for fire protection vehicles and emergency egress for patrons.

Alternatives C and D. Adequate protection would be afforded by building to code. No special problems are anticipated.[30]

8. SCHOOLS

Effect on the Downtown Community College Center.

The Downtown Center is expected to draw students citywide,

especially from people working in the financial and retail districts, for its business and career-oriented classes. The Center has been planned to respond to the needs of the downtown community, and the mix of residential and office development proposed under each YBC alternative would have an effect on the types of courses offered. Classes could also be given in housing developments or office buildings under an outreach program, if rooms were made available.[31]

1980. The 91,000 sq. ft. of office and retail-commercial space projected for development by 1980 under the various alternatives would have no impact on enrollment at the Downtown Center. Should rooms be made available at the convention center, it would be possible for classes or seminars to be given by Downtown Center staff.[32]

1988, Alternative A. Students drawn primarily from employees in the planned office and retail-commercial space would increase the enrollment at the Downtown Center, particularly in business classes. Industrial employees and local residents would also provide a pool from which some students would be drawn. The Downtown Center was designed, in part, to serve the needs of YBC after development; courses on the apparel industry have already been planned to serve employees of the apparel mart. As 27,500 people would be employed in YBC under Alternative A and approximately 80% of these would be office workers, there would be an increase in course enrollment.

1988, Alternative B. The recreation/entertainment park would not contribute to enrollment at the Downtown Center. The impact of the alternative would be similar to that of Alternative A, but to a lesser degree due to the employment of fewer than half as many office and retail-commercial workers. Due to the increased residential development under Alternative B, more courses geared to the needs of residents would be offered.[32] The Redevelopment Agency tentative proposal would have impacts intermediate between those of Alternatives A and B, with an intermediate number of office workers and residential development similar to that of Alternative B.

1988, Alternative C. As the Downtown Center was designed to accommodate development within YBC, as well as the business district, the further-reduced office and retail space could result in an enrollment for business courses below that anticipated. Fewer than one-fourth as many people would be employed in the area as in Alternative A. As in Alternative B, more courses would be given for residents of YBC, including courses geared to interests of the elderly, should an interest in such courses be demonstrated.

1988, Alternative D. The impact on the Downtown Center would be greater than that of Alternative A. There would be one-third more employees in Alternative D; most would work in offices (including 60% of the nominally downtown-support space) or retail-commercial establishments (including 30% of the nominally downtown-support space).

Effect on the Public and Parochial School Systems.

1980. None of the construction scheduled to be completed by 1980 under any of the alternatives would produce an increase in the number of school-age children, as all of the housing which would be completed by that time is designed for the elderly.

1988. Few school-age children would be expected to live in the 50 market-rate dwelling units planned atop the apparel mart under Alternative A,[33] and the subsidized housing for the elderly would house no school-age children. If the 900 dwelling units added in the Redevelopment Agency tentative proposal were all market-rate housing, 8 or 10 public school children might live in the YBC area. Alternative D, as defined, would produce no resident children.

The San Francisco Unified School District could accommodate the approximately 160 additional public school children expected by 1988 under Alternative B or C without the construction or expansion of schools[33] (see Table 48). Students would attend the same schools that children in the vicinity now attend. If the housing added by the Redevelopment Agency tentative proposal provided some subsidized family housing, impacts on

TABLE 48

SCHOOL-AGE CHILDREN LIVING IN YBC UNDER EACH ALTERNATIVE BY 1988*

	ALTERNATIVE			
	A	B	C	D
Additional Dwelling Units				
Subsidized Family	0	300	300	0
Market-rate	50	650	1,000	0
Public School Children				
Subsidized Family** Elem.	0	75	75	0
Subsidized Family** Jr & Sr High	0	75	75	0
Market-rate*** Elem.	0	2	3	0
Market-rate*** Jr & Sr High	1	6	8	0
Total Public School Children	1	158	161	0
Parochial School Children+				
Subsidized Family** Elem.	0	25	25	0
Subsidized Family** Jr & Sr High	0	25	25	0
Market-rate*** Elem.	0	1	1	0
Market-rate*** Jr & Sr High	0	1	3	0
Total Parochial School Children	0	52	54	0
Total Additional Children Public & Parochial School				
Elem.	0	103	104	0
Jr & Sr High	1	107	111	0

*No increase in resident school-age children would be expected under any alternative by 1980. No children are known to be living in the redevelopment area at the present time.
**Based on actual student population in Western Addition subsidized family housing.
***Based on actual student population in Golden Gateway Apartments.
+Approximately 25% of the total public and parochial school students enrolled in San Francisco attend parochial schools. (L. Jacobsen, Educational Needs Analyst, San Francisco Unified School District, telephone communication, August 5, 1977.)

schools would be similar to the impacts of Alternatives B and C. The number of public and parochial school children would depend on the number of subsidized family dwelling units.

The Department of Education of the Archdiocese of San Francisco currently has a total school enrollment below its capacity;[34] the increased parochial school enrollment of approximately 50 students under Alternatives B and C could be accommodated (parochial school enrollment citywide is about one-third that of the public schools). The pattern of enrollment is no longer predominantly by parish, so children would be expected to attend schools throughout the City.[34]

An estimated 100 children under the age of five would be expected to live in the family housing planned under Alternatives B and C.[35] These children would add to the existing South-of-Market demand for child care and pre-school facilities which is not now being met by the St. Patrick's Family Center at 366 Clementina St., the Central City Head Start Center at Fifth and Harrison Sts. or the few private facilities available in the South-of-Market area.[36]

9. PARKS AND RECREATION

A park acquisition is planned to the west of the Redevelopment area under the Open Space acquisition program to relieve the need of South-of-Market residents for park space. The Recreation and Park Department would be involved in the design and maintenance of the public park and convention center park.

Alternative A. The park area above the convention center would be scheduled for completion by 1980. If any structural elements were to be incorporated into the landscaping, specialized maintenance equipment would have to be acquired by the Recreation and Park Department. This park would require daily maintenance, similar to the demands of Union Square. By 1988 the convention center park would be used for lunch and recreation breaks by employees of the offices and apparel mart in YBC and

lunch breaks by workers from the Financial District. The convention center park would not lessen the need for the planned Open Space Program acquisition in the vicinity, because it would be used primarily by employees and residents of development proposed within YBC.[37] If the Redevelopment Agency tentative proposal retained the convention center park area, it would have effects similar to those of Alternative A. An additional 900 dwelling units would increase the need for the planned Open Space Program park.

Alternative B. The Recreation and Park Department would not be involved in the maintenance of the privately developed recreation/entertainment park. Should the recreation/entertainment park have enclosed grounds, the absence of any public park space under this Alternative would produce increased use of the nearby Open Space Program park planned for the use of community residents. Both the additional employees and residents of YBC would add to the use of the planned park.[37] Should the recreation/entertainment park have grounds which would be freely open to the public, it could be used by community residents. The degree and nature of use would depend on the developer's design of the park and the number of community-oriented facilities, such as crafts centers or playgrounds, provided within it. If the November 1977 Redevelopment Agency tentative proposal included a recreation/entertainment park, this plan would have effects similar to those of Alternative B. A public park in place of the recreation/entertainment park would be large enough to meet some of the South-of-Market park need.

Alternative C. The two-block park to be located on CB-2 and CB-3 would serve the residents of the housing to be developed by 1988 and also receive lunchtime use from workers in the area, relieving some of the South-of-Market demand. Maintenance by the Recreation and Park Department would be required.[37] Should an enclosed recreation/entertainment park be built in place of the public park, stress would again be placed on the planned Open Space Program park in the vicinity.

Alternative D. The lack of a public park coupled with the level of residential and commercial-office development planned for 1988 would create

an additional demand for park space which could not be met by the planned Open Space Program acquisition. This would exacerbate the park deficiency which already exists in the South-of-Market area.[37]

10. MEDICAL SERVICES

The YBC area has general, urban medical services. Deficiencies in the existing services are discussed in the South of Market Planning Task Force Draft Report of July 18, 1977. As most of the residents of the housing proposed for development under the various alternatives would be relocated from other areas of San Francisco, their impact on local medical services would involve a decrease in demand in other areas of the City. Business and industrial development would have an impact on emergency services which would be provided by San Francisco General Hospital (Mission Emergency). Rather than relying on the local clinic, most employees would be expected to have physicians near their places of residence.

1980. The elderly, such as the residents of the proposed 602 units of TODCO housing, customarily have private doctors because they receive medical assistance and few would be expected to use the South-of-Market Health Center.[38] Based on the similar Los Angeles Convention Center, an estimated 12 medical emergencies, mostly heart attacks, would occur each year at the YBC convention center.[39] These would receive first aid from a convention center First Aid Station nurse and then be treated at San Francisco General Hospital.

1988. Few of the elderly residents of the 602 units of TODCO housing proposed under all alternatives would use the South-of-Market Health Center. City homemaker and visiting nurses would be required by some of the elderly. No further impact, except for a level of medical emergencies consistent with urban business uses, would be expected under Alternative A, or under the Redevelopment Agency tentative proposal if all of the additional dwelling units were market-rate housing.

Under Alternatives B and C, the residents of the proposed 300 units of subsidized family housing would use Health Center facilities. The Center staff could be expanded, at the present location, to meet this demand.[38] Residents of the market-rate housing and business and industry employees would generally use private doctors. No further impact, except for emergencies, would be expected under Alternatives B, C, or D. If some of the units proposed to be added under the Redevelopment Agency tentative proposal were subsidized housing, effects would be similar to those of Alternatives B and C.

FOOTNOTES

[1]J. E. Kenck, Manager, City Distribution System of the San Francisco Water Department, personal interview, August 12, 1977.

[2]J. M. Dela Cruz, P.E., Section Chief, Bureau of Sanitary Engineering, San Francisco Department of Public Works, personal interview, August 12, 1977.

[3]San Francisco Datum (zero feet) is 8.69 feet above mean sea level.

[4]Flows are currently being estimated in a study by Dames and Moore, for the YBC Coordinator.

[5]R. Dorais, Turner Construction Company, telephone conversation, August 31, 1977.

[6]Dry-weather sewage flows would go to the Southeast Plant via the North Point Plant from all of the area north of Howard St. and from those blocks west of Fourth St. and east of Third St. which front on Howard, as well as from the portion of EB-3 which fronts on Second St. The sewage from the rest of the site would go via the Channel Pumping Station. (Refer to San Francisco Wastewater Management Plan EIR/S, May 1974, for additional information.)

[7]D. Birrer, Senior Civil Engineer, Transport-Storage, Wastewater Flow Control Division, Bureau of Sanitary Engineering, personal interview, August 29, 1977.

[8]Runoff from irrigation has not been included in the totals in Table 46. Water-conserving irrigation practices would minimize runoff.

[9]San Francisco Department of Public Works, Bureau of Engineering, 1959, Memo on "Storm Sewer Design Practice".

[10]R. McKillican, Industrial Power Engineer, San Francisco Division, Pacific Gas & Electric Company, telephone communication, November 15, 1977.

[11]City and County of San Francisco, 1977, West Side Transport/Storage Project FEIR, Vol. 1A.

[12]R. McKillican, Industrial Power Engineer, San Francisco Division, Pacific Gas and Electric Comapny, letter dated August 22, 1977.

[13]R. McKillican, Industrial Power Engineer, San Francisco Division, Pacific Gas and Electric Company, telephone communication, August 22, 1977.

[14]S. Snoek, Engineer, Office of the City Engineer, San Francisco Department of Public Works, letter dated July 18, 1977.

[15]R. Haughey, Shoreline Park Projects Engineer, City of Mountain View Public Works Department, telephone conversation, August 1, 1977.

[16]San Francisco Department of Public Works, 1975, San Francisco Solid Waste Management Plan.

[17]J. LaMarre, Project Director for YBC convention center, Turner Construction Company, telephone conversation, August 16, 1977.

[18]These potential sites are: San Leandro Bay Regional Shoreline (Oakland); Oyster Bay Regional Shoreline (Port Richmond); G. Miller, Jr. Regional Shoreline (San Leandro). FEIR's have been completed and adopted on all three sites and have been reviewed by BCDC. The convention center fill would not be used to fill the Bay, but would be used to raise the elevation of areas already existing in the parks. (D. Harms, Assistant Chief, East Bay Regional Parks, telephone communication, November 17, 1977.)

[19]J. LaMarre, Project Director for YBC convention center, Turner Construction Company, telephone conversation, August 18, 1977.

[20]J. LaMarre, Project Director for YBC convention center, Turner Construction Company, telephone conversation, July 14, 1977.

[21]R. J. Teglia, District Manager, Engineering, Pacific Telephone and Telegraph Company, letter dated July 29, 1977.

[22]S. Hossall, Sales and Operations Manager, U.S. Messenger and Delivery Service, telephone conversation, July 19, 1977.

[23]J. Smith, Foreman of Delivery, United States Postal Service, telephone conversation, July 21, 1977.

[24]Inspector D. Ewing, Burglary Division, San Francisco Police Department, telephone communication, October 21, 1977.

[25]E. Brown, Chief of Security, Los Angeles Convention Center, telephone communication, September 20, 1977.

[26]Sergeant E. Fowlie, Union Square Squad, San Francisco Police Department, telephone communication, October 14, 1977.

[27]Chief R. Rose, Division of Planning & Research, San Francisco Fire Department, personal interview, August 11, 1977.

[28]The high-pressure water supply system is reserved for the use of the Fire Department for fighting fires, and is completely independent of the domestic water distribution system.

[29]G. Bendix, Superintendent of Water Supply and Engineering, San Francisco Fire Department, telephone communication, August 15, 1977.

[30]Chief C. W. Carli, Fire Marshal, San Francisco Fire Department, personal interview, August 12, 1977.

[31]Dr. C. S. Biesiadecki, Director, Downtown Community College Center, telephone communication, September 19, 1977.

[32]Dr. C. S. Biesiadecki, Director, Downtown Community College Center, letter dated July 27, 1977.

[33]L. Jacobsen, Educational Needs Analyst, Facilities Planning Department, San Francisco Unified School District, telephone communication, August 5, 1977.

[34]Msgr. P. Dumaine, Director of Archdiocese of San Francisco Department of Education, telephone communication, August 15, 1977.

[35]Based on data from U.S. Department of Commerce, 1972, 1970 Census of Population and Housing, Census Tracts San Francisco-Oakland, California Standard Metropolitan Statistical Area, Bureau of the Census, Social and Economic Administration.

[36]P. Mitchell, Unit Coordinator, Children's Council, telephone conversation, December 22, 1977.

[37]T. Malloy, Assistant General Manager, San Francisco Recreation and Park Department, personal interview, August 16, 1977.

[38]Dr. W. Shore, Director, South-of-Market Health Center, telephone communication, September 9, 1977. Use by the elderly of private doctors was corroborated by J. Thomas, Manager, Clementina Towers, telephone communication, September 20, 1977.

[39]E. Brown, Chief of Security, Los Angeles Convention Center, telephone communication, September 20, 1977.

F. TRANSPORTATION

This section deals with the impacts of the alternatives on the available transportation systems. The analysis is based on travel generation (auto, transit, pedestrian) for each of the alternatives. The emphasis is on identification of the downtown peak hour transportation demands. For special events, other times are also discussed. Consideration has been given to parking demand and supply for the existing condition and each alternative. For greater detail (particularly as to methods of analysis and intermediate calculations) than is presented in this section, see Appendix F.

Trip generation rates (Table F-1, Appendix F) were applied to the alternative land use designations to produce estimates of person trip-ends for a representative weekday and a representative Saturday. Trip-ends represent the travel associated with any particular land use. For example, the arrival of a person at a restaurant and his subsequent departure represent a total of two person trip-ends for the one "trip".

Travel generated for the alternatives was distributed throughout San Francisco and the region (Table F-14, Appendix F); it would be influenced by the time of day, the day of the week the trip is made, and the nature of the trip. The principal modes of travel would be walking, transit, and automobile. Other modes include service and delivery vehicles, taxis and jitneys. Modal splits (assignments of travel to the various modes) are shown in Table F-15, Appendix F.

Pedestrian travel would include: (a) travel from YBC residential units to functions within the area and to transit lines; (b) worker and visitor travel from YBC to the downtown hotels, shopping, other offices, automobile parking, the Southern Pacific Railway, BART and the Trans-Bay Terminal; and (c) shorter pedestrian trips (workers and visitors) to Muni, Golden Gate Transit, or SamTrans. Pedestrian concerns include vehicle loading and unloading, pedestrian waiting areas at bus

stops, flows along the principal sidewalks and walkways connecting principal YBC traffic generators, and safety at intersections.

The amount of travel for service and delivery vehicles in the area currently amounts to about 3% of the vehicle travel in the downtown area;[1] it is expected (TJKM judgment) to remain at about the same percentage.

Parking within the area includes that defined for public parking for Alternatives A and B, and that estimated for private parking as it may be developed in accordance with the Department of City Planning Master Plan policies and the requirements of the Planning Code (See Appendix F).

The transportation impact analysis is based primarily on weekday peak hour travel demand estimates compared to the capacity of the street network to handle travel at Level of Service "D" (See Section V.F, page 149). Nighttime and Saturday impacts also are considered.

Total Travel

For general comparison, Table 49 shows the travel generated by the alternatives, compared with the existing generation. The Table shows that the numbers of generated trip-ends for nighttime and weekend peaks are less than for the weekday peak. As the existing (base) traffic is also heaviest during the weekday peak, the analysis of congestion can be limited to that period, except for special events. Travel generated by the Redevelopment Agency November 1977 tentative proposal would be the same in 1980 as that generated by Alternatives A and B; it would be intermediate between these two alternatives in 1988. Table 49 also shows the relative differences in generated traffic among the alternatives.

Transportation Modes

Pedestrians. Figures 31 through 34, pages 319 through 325, show the principal pedestrian flow routes and peak-15-minute volumes for

the alternatives. The external pedestrian movements would be those to the Montgomery and Powell BART stations, the Hotel, Retail, and Financial Districts, the Transbay Terminal for access to A-C Transit, and the Fremont and Mission St. area for access to the Golden Gate Transit bus routes. In addition, there would be a movement to the Southern Pacific Railway Terminal. Pedestrian movements north of Market St. are not shown on the figures; it is not feasible to portray these because the branching in so many directions precludes estimation of flows along individual North-of-Market streets.

TABLE 49

OVERALL YBC TRAVEL PROJECTIONS - Person Trip-Ends

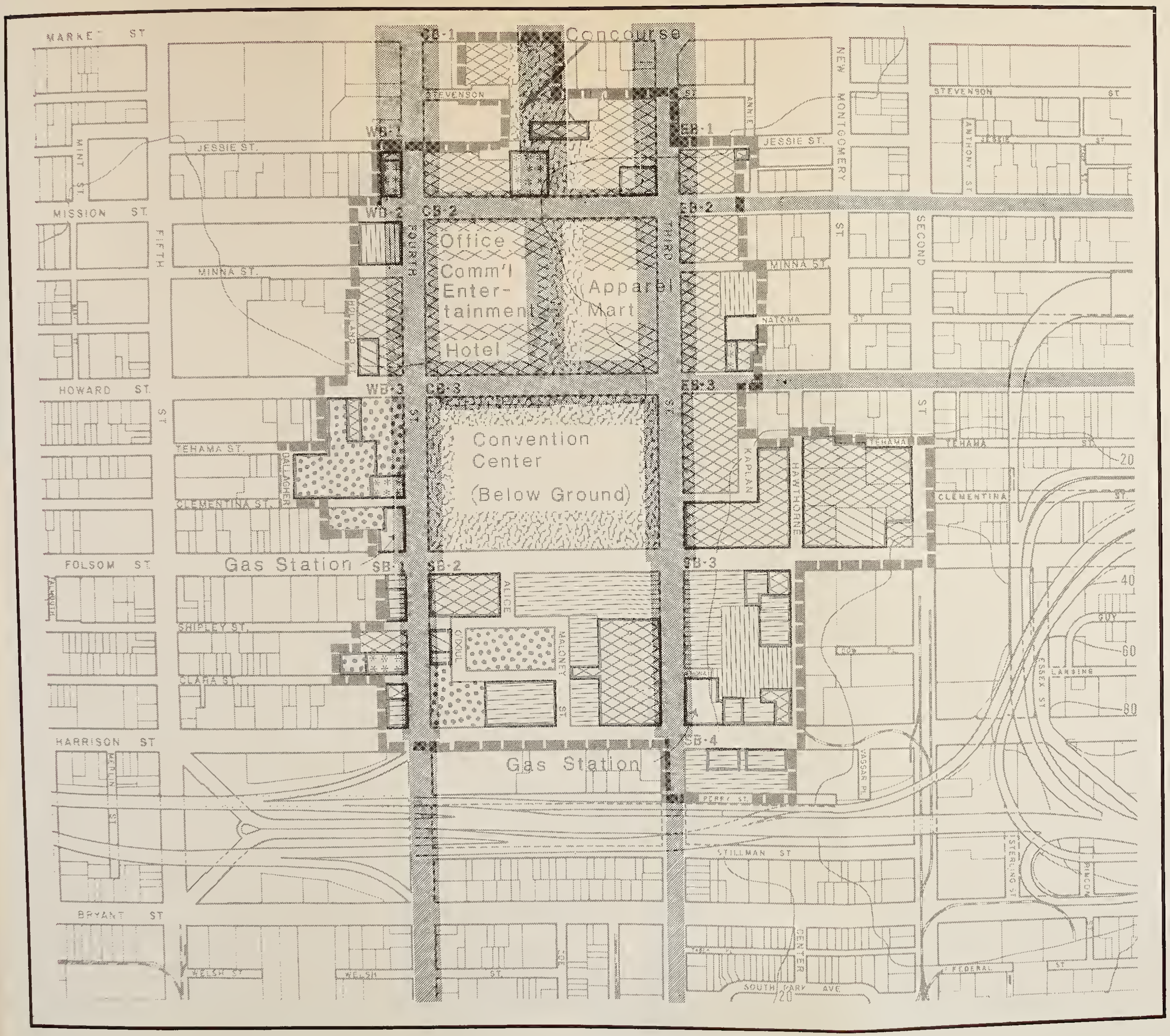
TIME	EXISTING	ALTERNATIVES, 1980 A, B	ALTERNATIVES, 1980 C, D
Weekday (24-hr)	24,600	79,600	31,700
Weekday Peak Hour (4:30 - 5:30 P.M.)	2,200	7,200	2,900
Nighttime (7:00 - 8:00 P.M.)	400	6,600	600
Saturday (3:00 - 4:00 P.M.)	800	1,000	1,000

	ALTERNATIVES, 1988 A	B	C	D
Weekday (24-hr)	208,800	131,300	65,100	128,500
Weekday Peak Hour (4:30 - 5:30 P.M.)	18,800	11,800	5,800	11,600
Nighttime (7:00 - 8:00 P.M.)	12,600	9,100	1,200	4,800
Saturday (3:00 - 4:00 P.M.)	9,800	7,000	3,000	14,300

The levels of service for pedestrian volumes on sidewalks, as developed by Fruin,[2] are shown in Table 50, page 327. The YBC peak pedestrian volumes would be northerly to BART and Market St.; they would occur at the same time that Third and Fourth St. sidewalks are occupied with pedestrians from outside uses. The result would be pedestrian flow rates approximately Level of Service "C" for the sidewalks. People waiting for buses could block 10-15 feet of sidewalk, or more. Table 51 shows the pedestrian peak loading on selected sidewalks. Peak pedestrian loadings and flow rates of the Redevelopment Agency tentative proposal would be intermediate between those of Alternatives A and B.

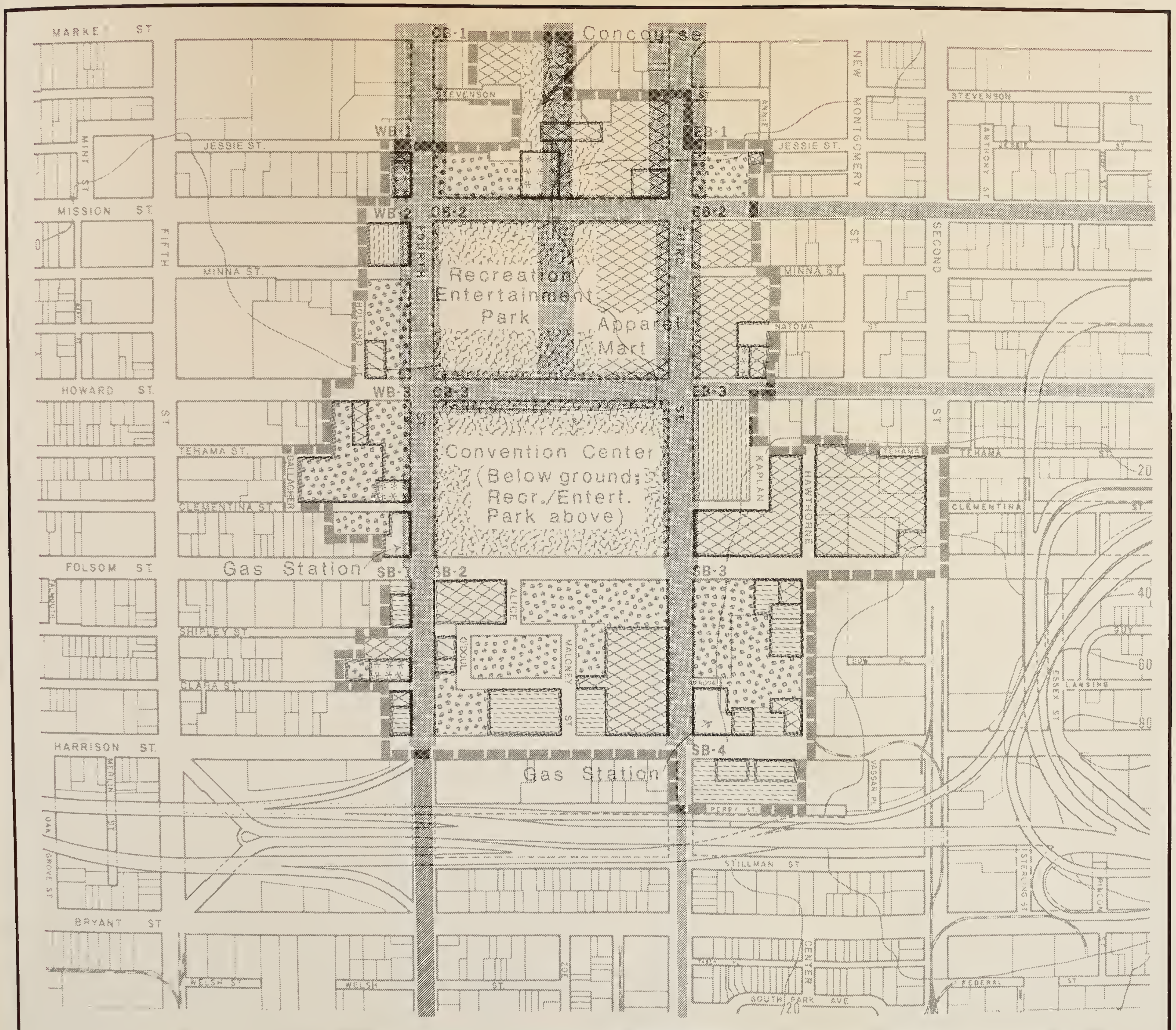
The effect of a convention with maximum attendance (24,000 persons) on pedestrian movement has been included in Table 51, page 328. Should a special event such as a rock concert be held in the convention center, there could be a higher peak pedestrian demand on the adjacent sidewalk system. This could add up to 10,000 pedestrians in a 15-minute period to the sidewalks along Howard St. This demand is estimated (TJKM judgment) to split 25% to auto, 35% to walking and 40% to transit (Muni, charter buses, other transit, and taxis). About 25% of the transit demand (10% of the total) could be handled by charter buses and taxis in the convention center loading zone (internal) along Howard St. (See Figure 37, page 343.) The remainder would walk to Muni, etc. Muni buses would continue to load at the existing stops: Howard St. buses at the northwest corners of the Fourth St. and the Third St. intersections, Third St. buses at the northeast corner of the Howard St. intersection, and Fourth St. buses at the southwest corner of the Howard St. intersection. The resulting pedestrian flow would be greatest on the south side of Howard St. toward Third and Fourth Sts. The resulting flow rate of 23 pedestrians/foot/minute would be exceeding the capacity (Level "D") of the adjacent sidewalks. Use of the Howard St. overpass could relieve some of this pressure.

Transit. The transit impact analysis was done at check points around YBC for Muni, SamTrans and Golden Gate routes passing through the YBC area. Figure 35, page 331, shows the check points and the transit lines passing each point. Appropriate stations or terminals

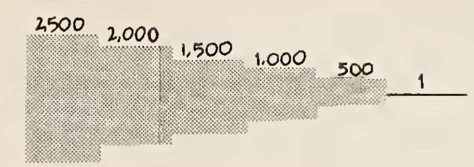


PRINCIPAL
PEDESTRIAN FLOWS
ALTERNATIVE A, 1988

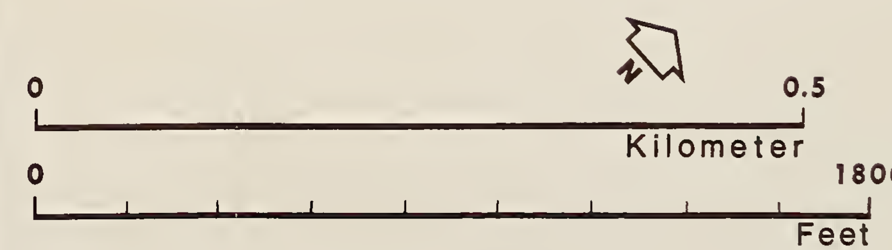
31



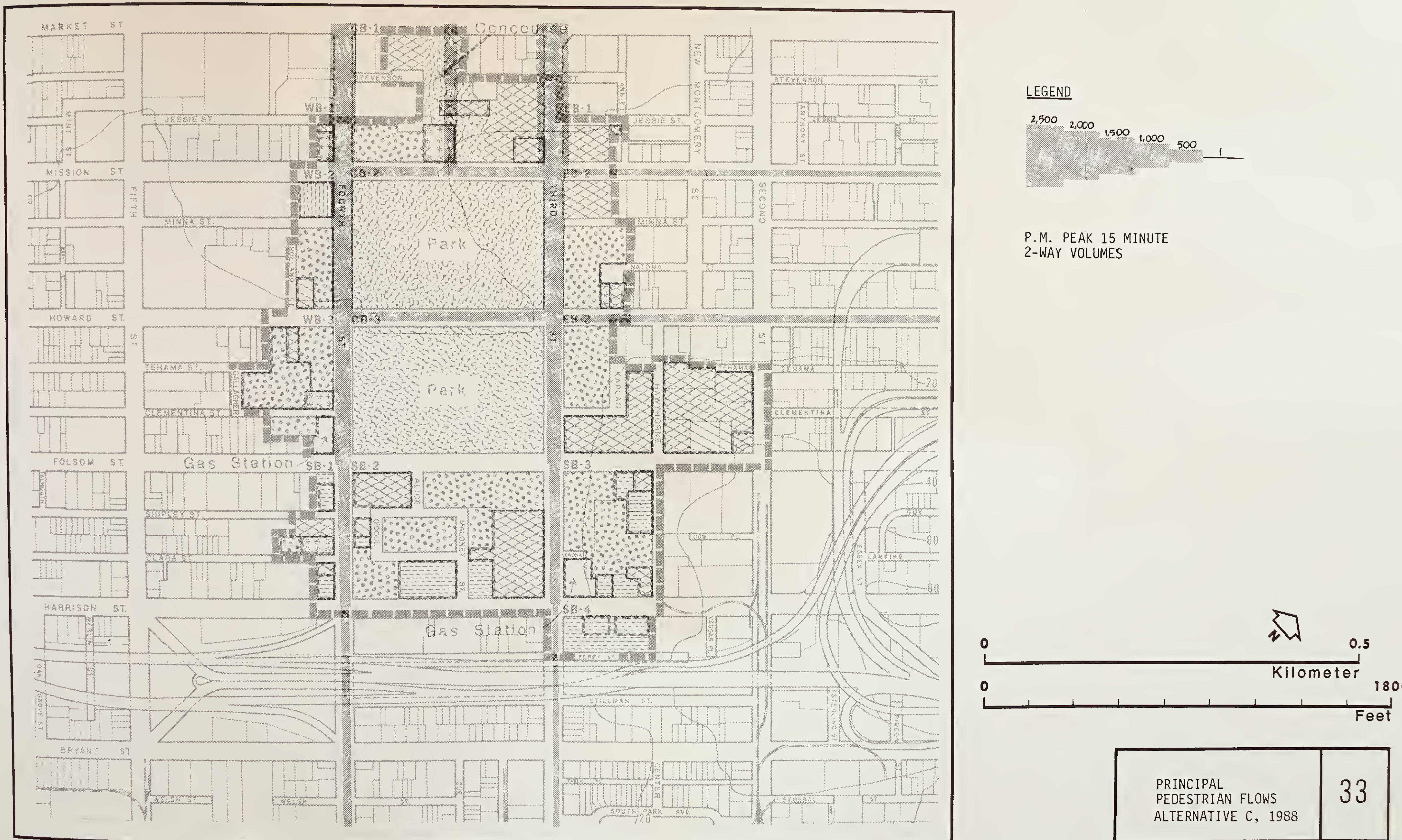
LEGEND



P.M. PEAK 15 MINUTE
2-WAY VOLUMES

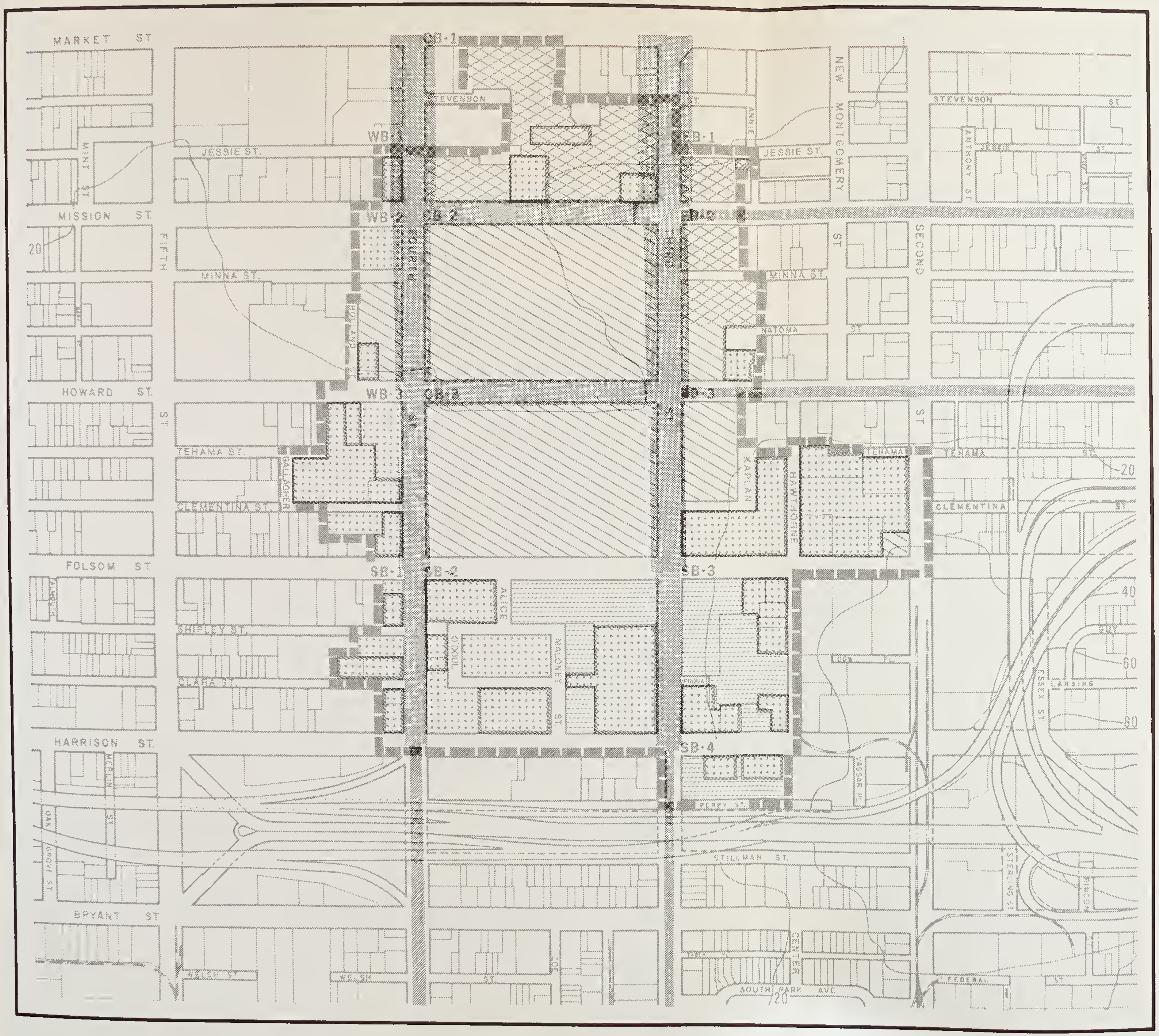


PRINCIPAL PEDESTRIAN FLOWS ALTERNATIVE B, 1988	32



PRINCIPAL PEDESTRIAN FLOWS ALTERNATIVE C, 1988

33



LEGEND

2,500 2,000 1,500 1,000 500 1

P.M. PEAK 15 MINUTE
2-WAY VOLUMES

0 0.5 Kilometer

0 1800 Feet

PRINCIPAL PEDESTRIAN FLOWS ALTERNATIVE D, 1988	34

were analyzed for the other transit modes: BART, A-C Transit, and Southern Pacific Railway. The jitney service on Mission St. and to the Southern Pacific station was not analyzed quantitatively; less than 1% of YBC travel would be likely to use the jitneys. The jitneys are reported[3] to be operating below capacity on a daily basis and could carry additional patrons. However, peak hour observations by the EIR Team (TJKM) showed the 12-15 passenger vans to be at capacity.

TABLE 50

PEDESTRIAN LEVELS OF SERVICE

Level of Service	Walking Speed Choice	Conflicts	Pedestrian Flow Rates (P/F/M)*: One-Way Flow (Commuters)	Two-Way Flow (Shoppers, etc.)
A	Free Selection	None	< 8	< 7
B	Some Selection	Minor	8-11	7-9
C	Restricted	High Probability	11-16	9-14
D	Some Reduction	Multiple	16-21	14-19
E	All Reduced	Frequent	21-26	19-23
F	Shuffle Only	Unavoidable	> 26**	> 23**

*P/F/M = Pedestrians per foot of sidewalk width per minute.
**At Level F, the (attempted) flow rate degrades to zero at complete breakdown.

SOURCE: See Footnote 2.

TABLE 51

PEDESTRIAN LOADINGS AND FLOW RATES (P.M. Peak 15-Minutes - 1988)

Sidewalk Location and Effective Width*	ALTERNATIVE A Volume**	A Rate+	B Volume	B Rate	C Volume	C Rate	D Volume	D Rate
Fourth Street Market to Mission (2 @ 6 ft.)	2,200	12	1,800	10	1,000	6	1,600	9
Fourth Street Mission to Howard (2 @ 6 ft.)	1,700	9	1,400	8	800	5	1,300	7
Pedestrian Concourse Market to Mission (25 ft.)++	1,600	5	1,200	4	500	2	-	-
Pedestrian Concourse Mission to Howard (25 ft.)	1,300	4	1,300	4	-	-	-	-
Third Street Market to Mission (2 @ 6 ft.)	2,100	12	1,800	10	1,200	7	1,700	9
Third Street Mission to Howard (2 @ 6 ft.)	1,800	10	1,500	9	800	5	1,300	7
Howard Street, Convention Center to Third (South Side, 9 ft.)	1,400	11	1,400	11	400	3	1,100	8
Howard Street, Convention Center to Fourth (South Side, 9 ft.)	1,600	12	1,600	12	400	3	1,100	8

*Effective widths take account of poles, planter boxes, people standing at store windows, etc.

**Pedestrians per 15 minutes.

+Pedestrians per minute per foot of sidewalk width.

++A mid-block ramp to BART is proposed; not all the flow would reach/come-from Market Street.

The Muni serves practically every block in the YBC area with a network of motor coach, trolley coach, streetcar or cable car lines. Muni Metro will be adding to the streetcar capacity by 1979.[4] The magnitude of the expected capacity increase varies, depending upon the time of day. Muni calculations indicate that the two-hour p.m. peak capacity will approximately double.[4]

The EIR analysis procedure added the existing patronage and the additional demand (volume) predicted for each alternative to obtain total loading on the system. The loading was then compared with the capacity of the Muni lines (see Appendix F for details) at the external check points (see Figure 35). The results are in the form of a demand/capacity ratio (expressed as a percentage) for the 4-6 p.m. peak period and are shown in Tables 52 and 53 for the 13 check points. P.M. peak patronage data were available for only the peak two-hour period. The Redevelopment Agency tentative proposal would have peak period demand/capacity ratios intermediate between those shown for Alternatives A and B. As can be seen from the two tables, the demand/capacity ratio would exceed 100% for the Geary St. and Second St. lines outbound for some alternatives, and for the Powell St. cable car, both inbound and outbound, for all alternatives. On other routes, there is currently excess peak period capacity to handle additional downstream demand (averaged over two hours). However, for the peak hour or half-hour, by EIR Team (TJKM) observations, the Muni lines are at capacity today on most routes. (To avoid misinterpreting the demand/capacity table, the reader should compare the changes from the existing conditions rather than concentrating on the absolute values shown.)

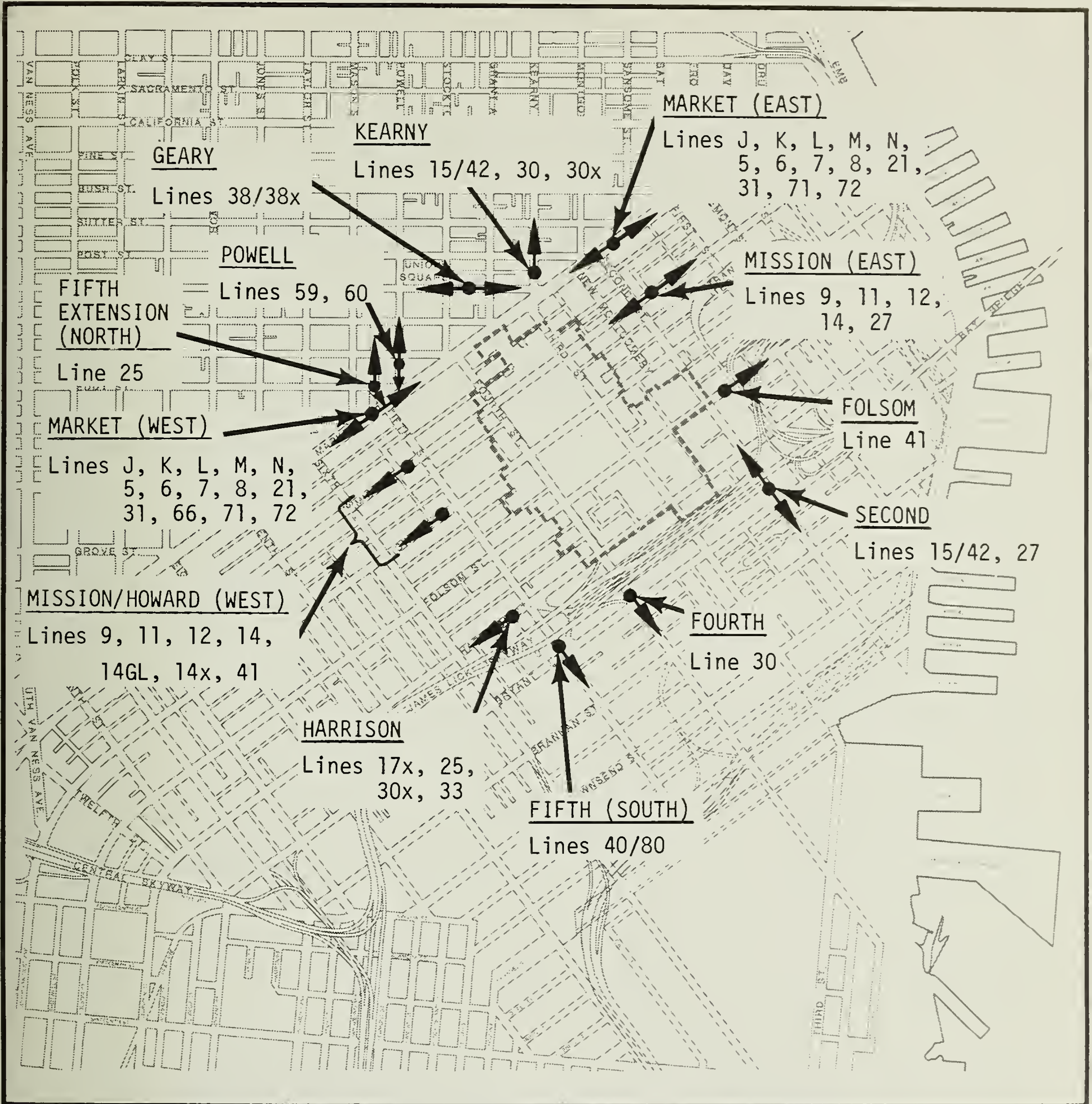
The Muni demand/capacity analysis has been based on an assumed constant (non-YBC) patronage and equipment supply condition. It is recognized that Muni Metro will increase Muni's system capacity and possibly patronage.[5]

TABLE 52

MUNICIPAL RAILWAY DEMAND/CAPACITY RATIOS (%)
FOR THE P.M. PEAK (4-6 P.M., Outbound)*

CHECK POINT	Existing	DEMAND/CAPACITY RATIOS (%) 1980 Alternatives A,B	1980 Alternatives C,D	1988 Alternatives A	1988 Alternatives B	1988 Alternatives C	1988 Alternatives D
Market (east)	14	15	14	17	16	14	16
Market (west)	44	44	44	56	52	46	53
Mission (east)	18	23	18	29	26	20	26
Mission/Howard (west)	50	55	50	62	58	52	59
Folsom	3	5	3	7	6	4	6
Kearny	57	60	52	71	65	54	66
Geary	89	104	90	124	112	94	115
Second	71	84	72	102	92	75	94
Fourth	31	32	31	36	35	32	35
Fifth (south)	30	32	30	37	35	31	35
Fifth Extension (north)	23	49	24	83	63	32	67
Harrison	50	59	50	71	64	53	66
Powell	125	139	126	158	147	130	149

*The 4-6 p.m. 2-hour period is the standard time internal for p.m. peak ridership survey data collection. In the peak hour or peak half-hour, most of these lines are at capacity. The table is most useful as a comparison among the alternatives.



LEGEND

Check point

40/80 Muni line numbers

0 0.5 Kilometer

0 1800 Feet

N

EXTERNAL MUNI CHECK POINTS	35

TABLE 53

MUNICIPAL RAILWAY DEMAND/CAPACITY RATIOS (%)
FOR THE P.M. PEAK (4-6 P.M., INBOUND)*

CHECK POINT	Existing	DEMAND/CAPACITY RATIOS (%) 1980 Alternatives		1988 Alternatives			
		A,B	C,D	A	B	C	D
Market (east)	10	10	10	11	10	10	11
Market (west)	55	55	55	58	57	56	58
Mission (east)	37	37	37	39	38	38	39
Mission/Howard (west)	17	17	17	21	19	18	21
Folsom	3	3	3	4	4	3	4
Kearny**	53	53	53	58	56	55	58
Geary	24	24	24	33	28	27	32
Second	29	29	29	35	32	31	35
Fifth Extension (north)	18	18	18	33	25	22	32
Harrison	30	30	30	36	33	32	36
Powell	154	155	155	163	171	157	162

*See footnote, Table 52.
**Kearny St. is one-way northbound. The inbound Kearney St. lines return on First St. (Lines 15/42) or on Fourth St. (Lines 30/30X).

For the 4-6 p.m. peak period there are several observations relative to the impact of YBC on Muni. Scheduled headways are often not realized, with a resulting degradation of service. General observations (outbound transit) for the potential problem check points are discussed below:

- Geary Street transit lines (westbound) would be over capacity with Alternative A by 1980 and with Alternatives A, B and D and the Redevelopment Agency tentative proposal by 1988.

- By 1988, Second Street to the south would be near or over capacity, with demand/capacity ratios of up to 102% for Alternative A.

- Other principal check points such as Market (westbound) and Mission/Howard (westbound) would be estimated to be at 46-62% of capacity for the range of alternatives by 1988. For the Muni lines crossing these check points, some might be at capacity while others might be under capacity. The downstream additions would add to capacity problems on some lines. With several lines at or exceeding capacity, some patrons could seek alternate Muni routes (perhaps with a transfer required) to reach their destinations.

- The data for the check points for Market (eastbound) and Mission (eastbound) are based on an assumption that the existing patronage east of the project is the same as the existing patronage between Fifth and Sixth Sts. for east-bound vehicles. This means that the inbound p.m. peak Muni demand/capacity ratio generally is low and travelers in the off-peak directions would have adequate space.

Additional Muni nighttime patronage would present no load problems, because of available capacity after the peak. Localized impacts could occur in the vicinity of the convention center, for special events, with sidewalk blockage at transit loading locations.

Table 54 shows the demand/capacity ratios (expressed as percent) for Southern Pacific, SamTrans, Golden Gate Transit, BART, A-C Transit and Harbor Carriers, Inc. for each of the four alternatives for the p.m. peak two-hour period. The impacts of the Redevelopment Agency tentative proposal would be intermediate between those of Alternatives A and B in 1988.

TABLE 54

DEMAND/CAPACITY RATIOS (%) FOR TRANSIT OTHER THAN MUNI
FOR THE P.M. PEAK PERIOD (4-6 p.m.)

TRANSIT AGENCY ROUTE	Existing	DEMAND/CAPACITY RATIOS (%) 1980 Alternative A,B	1980 Alternative C,D	1988 Alternative A	1988 Alternative B	1988 Alternative C	1988 Alternative D
Southern Pacific	62	64	62	69	67	63	67
SamTrans	67	125	70	246	187	92	199
Golden Gate Transit							
Buses							
First Street Routes	65	66	65	67	66	65	67
Howard Street Routes	53	59	53	70	64	55	65
Ferries (Larkspur, Sausalito)	41	42	41	43	42	41	43
Harbor Carriers, Inc.							
Tiburon Ferry	43	44	43	45	44	43	44
BART							
Transbay (Outbound)	45	46	45	47	48	45	48
(Inbound)	3	3	3	3	3	3	4
Westbay (Outbound)	46	48	46	50	48	47	49
(Inbound)	2	2	2	3	2	2	3
A-C Transit (Outbound)	66	68	66	72	70	67	70
(Inbound)	18	18	18	20	19	19	21

*See footnote, Table 52.

These demand/capacity ratios show potential loading greater than assumed capacity for SamTrans. The other agencies exhibit potential loadings below capacity. Peak half-hour demands would show more overloading. Data for BART show that the peak 5-minute demand/capacity ratio for transbay p.m. peak travel is 180% of seated capacity.[6] The other transit agencies have similar peaking characteristics, but usually not to the same extent.

The potential overload on SamTrans of up to 246% (Alternative A) is the result of assignment of all of the new Peninsula-bound bus travel generated by the project to the Mainline (U.S. 101) route. An alternate route for Peninsula-bound travel currently operates on I-280 south of Daly City and carries part of the existing load. No YBC travel has been assigned to this route since access is made via a transfer from SamTrans to the BART system at the Daly City BART Station (such a connection is contrary to City policy[7]). As SamTrans is the newest agency operating in the YBC impact area (service initiated July, 1977), schedule changes responding to future patronage levels may be expected to occur.

The demand/capacity ratios for Southern Pacific are calculated on the basis of all of the available rolling stock (50 gallery cars and 32 suburban cars[8]). SP is currently providing 75% of this total capacity (7,500 seats), of which 80% is being occupied. SP policy is to provide one seat per passenger; train lengths are assembled accordingly. If SP were to utilize the residual capacity available, the demand/capacity ratios would be the ones shown in Table 54. Should SP be permitted to drop its commuter rail service, as it has requested, an additional passenger load would have to be absorbed by SamTrans or other transportation modes.

The potential nighttime loadings for transit with night service to YBC are not large enough to present problems with respect to available capacity. Calculations show the current nighttime loadings on SamTrans, Golden Gate Transit and BART to be 40% of capacity or less. Projected 1988 demands would not approach capacity.

Mixed Vehicles. As described under the analysis methodology (Appendix F), the mixed-vehicle analysis is based on assignment of traffic to the seven geographical areas used in this study: North Bay; Peninsula; East Bay; Downtown/Northeast; and Northwest, Southwest, and Southeast San Francisco. Traffic was assigned over several routes within San Francisco. For the impact analysis there are ten intersections within and near YBC through which most of this traffic passes, where the greatest potential effect on level of service would be expected. These were used for the impact analysis. The projected impacts on the ten intersections represent the maximum that could be expected for 1980 and 1988. There would be localized impacts at points of entry to the principal streets (Mission, Third, etc.) from parking garages and lots.

Assumptions were made that the principal parking would be that adjacent to the southerly YBC limits in the vicinity of Harrison and Bryant Sts. and that any long-term increases in parking would be in this general area.

The intersections analyzed are circled on Figure 36. These ten intersections cover the principal one-way streets in the YBC area and access points to the James Lick Freeway and the Bay Bridge. Table 55, (page 341), lists the intersections analyzed, the resulting average vehicle headways and the mixed-vehicle guideline headways previously developed (Level of Service "D", Section V.F) for use in the impact analysis. (Mixed-vehicle levels of service should not be confused with the (sidewalk) pedestrian levels of service defined earlier in this section. For a given volume of vehicles at an intersection, mixed-vehicle level of service deteriorates as the pedestrian volume in the crosswalks increases.) "Critical Lane Volumes", defined in Section V.F and in Appendix F, can be calculated from the headways by the method given in Appendix F.

Four of the intersections are in areas having "light" pedestrian volumes (defined in Appendix F), where a mixed-vehicle guideline headway of 2.6 seconds would indicate Level of Service "D". This same level of service at Third and Mission (where pedestrian volumes are "moderately high") would be indicated by an average mixed-vehicle guideline headway

of 3.6 seconds. Fourth and Market, with "high" pedestrian volumes, has a guideline headway of 4.5 seconds. On Second St. the pedestrian volumes are "moderate" (guideline headway 3.0 seconds). Existing levels of service vary from "A" to "D", except for that at Fourth and Market, which is "D-E."

Table 55 indicates that: (a) In 1980, tabulated intersections would be operating within vehicular Level of Service "D" except at Third and Mission and at Fourth and Market; and (b) In 1988, additional intersections would be at, or worse than, Level "D", particularly for Alternative A. The Redevelopment Agency tentative proposal would be intermediate between Alternatives A and B; in 1988, for all but the Third and Folsom intersection those two alternatives would have headways that differ by a few tenths of a second (from each other). In the tentative proposal, the 1988 Level of Service at the peak p.m. period at Third and Folsom would probably be worse than "D". The worst congestion would be at Third and Mission and at Fourth and Market; Level of Service at these intersections would be "F". This analysis is for the peak 15 minutes; the impact would not be as great over the full peak hour. The net effect would be a spreading of the peak time later in the period. The chief effect of degraded vehicular Levels of Service is that vehicles have to wait for several signal changes to clear intersections, and that long queues form. Pedestrians are unaffected unless vehicles block crosswalks.

The convention center is proposed to have an internal passenger arrival/departure area on the south side of Howard St. (a one-way westbound street), midblock between Third and Fourth Sts. (see Figure 37, page 343). Autos, taxis and charter buses would arrive in the southernmost of the Howard St. lanes, pass the exit point, and then turn into the entry area. (They would make a 180^{o} turn so that the right side of the vehicle would face the convention center entrance). Conflicts could occur, especially during the p.m. peak 15 minutes, when the intersection of Fourth and Howard Sts. would be operating at about Level of Service "E" in 1988, with potential backups in all Howard St. lanes.

LEGEND

Analyzed intersections

Outbound traffic movement

Inbound traffic movement

0 0.5 Kilometer

0 1800 Feet

N

MIXED VEHICLE HEADWAY ANALYSIS	36

TABLE 55

AVERAGE VEHICLE HEADWAYS FOR THE PEAK 15 MINUTES OF THE P.M. PEAK

INTERSECTION	AVERAGE VEHICLE HEADWAY* (Seconds)							MIXED-VEHICLE LEVEL OF SERVICE "D" GUIDELINE HEADWAY (Seconds)
	Existing	1980 Alternatives		1988 Alternatives				
		A,B	C,D	A	B	C	D	
Fifth & Howard	3.5	3.0	3.3	2.0	2.3	2.6	2.1	2.6**
Fifth & Bryant	5.0	4.0	4.8	3.0	3.3	3.9	3.2	2.6**
Fifth & Harrison	3.3	2.9	3.1	2.1	2.3	2.6	2.2	2.6**
Fourth & Market	3.9	3.7	3.7	3.0	3.1	3.1	3.0	4.5++
Fourth & Harrison	3.7	2.9	3.5	2.1	2.3	2.9	2.3	2.6**
Fourth & Howard	3.4	3.0	3.3	2.4	2.5	2.7	2.5	3.0+
Third & Mission	3.7	3.3	3.5	2.6	2.7	3.0	2.5	3.6***
Third & Folsom	6.4	4.9	4.8	3.1	3.7	4.6	3.3	3.6***
Second & Folsom	3.9	3.6	3.7	3.0	3.0	3.2	3.0	3.0+
Second & Bryant	8.7	7.7	8.2	6.2	6.5	7.0	6.5	3.0+

*Note that YBC increments are added to existing volume levels (see Section V.F., Setting).
**Light pedestrian volumes (definitions in Appendix F)
***Moderately high pedestrian volumes.
+Moderate pedestrian volumes.
++High pedestrian volumes

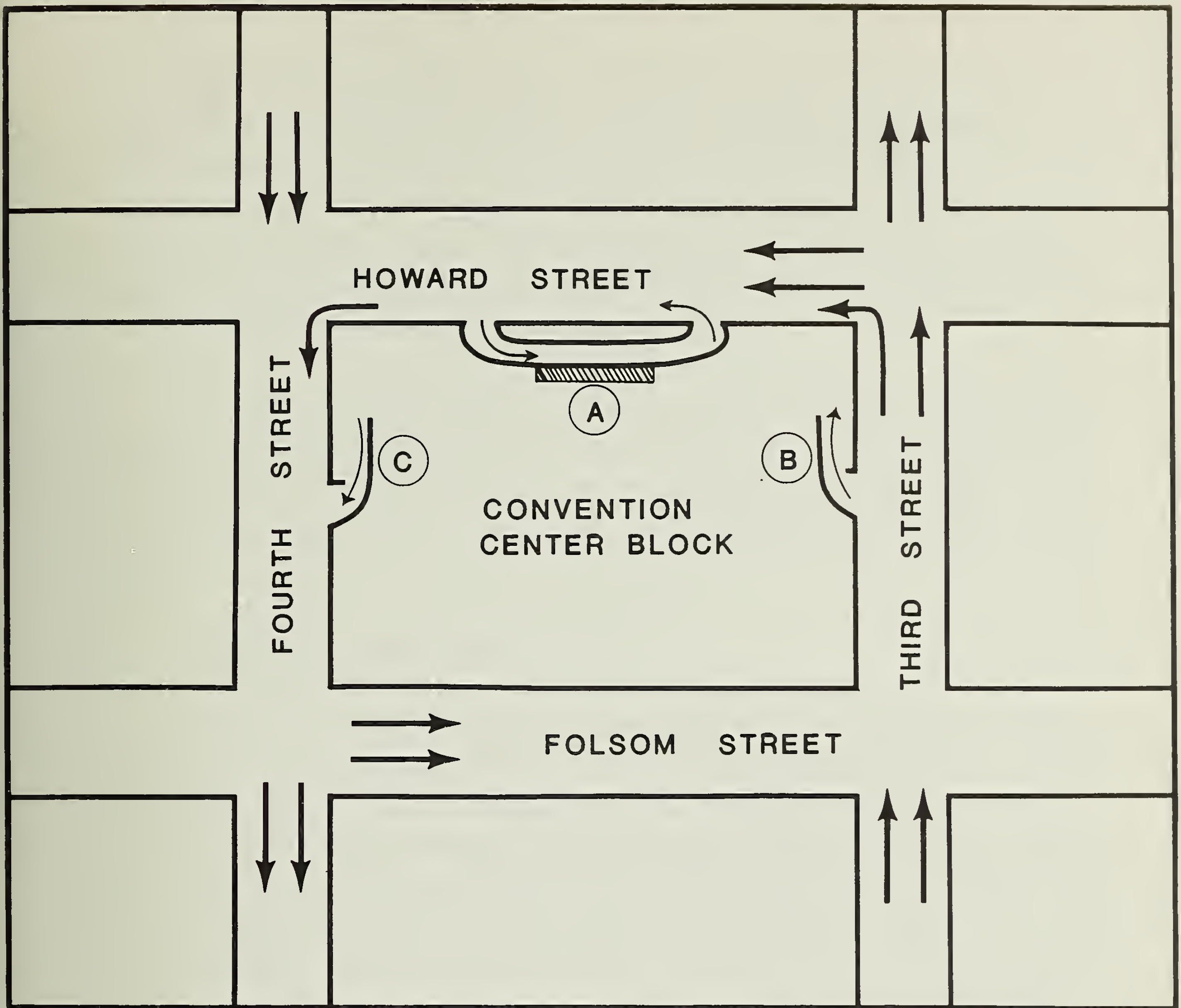
Trucks. The mix of service and delivery vehicles would consist of light, medium, and heavy trucks. A number of these vehicles are relatively small and have been included in the impact analysis for mixed vehicles discussed previously. The more-specific impact of commercial-vehicle activity would be potential congestion at the actual loading points if access and truck storage area at loading docks were inadequate.

It is anticipated that the service and delivery activity would follow the same patterns identified in the Downtown Parking and Traffic Survey.[1] It can be expected that most of the commercial vehicle arrivals would occur in the morning hours and reach a peak accumulation (storage of vehicles on-site) during the late morning. Most of the vehicles would be station-wagons, vans, or small trucks; it could be expected that about 3% of the commercial vehicles would be over 40 feet in length.

Localized truck activity associated with the convention center would be accommodated by an underground loading dock. The proposed design[9] incorporates nine bays for trucks up to 62 feet in length and three bays for shorter trucks. Access to the underground loading area would be via a ramp fronting on Third St. between Howard St. and Folsom St. (See Figure 37). Trucks would depart via a similar ramp on Fourth St. between Howard and Folsom Sts.

The heaviest amounts of convention center truck activity would occur during the set-up and take-down periods before and after a convention. During these periods the number of trucks waiting to be served has been estimated[10] to be approximately 10 to 15. Because of the need for emergency access, these could not be stored on the entry area ramp. No provisions have been made for accommodating trucks waiting (at the Third St. ramp) to enter the loading area.

Other Traffic. Other traffic (taxis and jitneys) is included in the mixed-vehicle analysis as part of the regular traffic stream. For special events at the convention center there could be 100 taxi trips and 10-20 charter buses per hour (peak hour) serving an event.



Sketch: Not to Scale

LEGEND

(A) Passenger arrival/departure area (at Howard Street level)

(B) Truck entrance ramp down to underground unloading area (at Exhibit Hall level)

(C) Truck exit ramp up from underground unloading area (at Exhibit Hall level)

CONVENTION CENTER ACCESS	37

Although the taxi supply is currently at a low level, it is anticipated that the former Yellow Cab Service of about 500 taxis would be activated under different ownership, bringing the total number to 711 taxi service permits.[11] Of these, 350 would be held by new owners (of the old Yellow Cab permits), and 361 would be current permits held by other companies and individuals. Adequate service would be available for the convention center and other generators in YBC.

In the transit analysis, the jitney service currently running along Mission St. has not been allocated any YBC patrons. It is available for service and is currently running near capacity in the YBC area in the p.m. peak hour, and at capacity at some downstream points during that peak.

Parking Characteristics.

Table 56, page 348, shows the parking space supply for each alternative, the parking demand generated for the daytime hours, and the resulting parking space deficiency. The parking demand for each alternative has been generated from the total estimated travel by auto to the YBC area with vehicle-occupancy, daytime-proportion-of-trips, and parking-space-turnover factors applied, as developed in Appendix F. The Redevelopment Agency tentative proposal would provide 490 more public parking spaces than Alternative A, and a number of private parking spaces intermediate between those of Alternatives A and B. The parking demand for the tentative proposal would be intermediate between those of Alternatives A and B; the actual number would depend on the amount of office and commercial space replaced by other uses, as would the private parking supply. The expected deficiency of parking spaces for the tentative proposal would be intermediate between those of Alternatives A and B. The impact of provision of a recreation/entertainment park in the Central Blocks in place of public park and office/hotel space is discussed on page 351.

New YBC developments would be replacing public and private parking in some cases. The parking deficiency would be aggravated

because persons (most of whose destinations are outside YBC) now using the existing supply of 5,800 spaces in the YBC area would for the most part have to park elsewhere. The displaced autos would disperse into the surrounding area in search of parking spaces. Another possibility is a diversion of some people from the auto to Muni and other available transit. (In the South-of-Market area bounded by Market, Ninth, Bryant and Steuart Sts., average off-street parking use is about 73% [vacancy rate about 27%]) (Parking Conditions and Trends, December, 1975, S.F. DPW). Not counting spaces in the YBC area, about 5,700 of the existing 21,000 off-street spaces were available as of 1975. This availability would be reduced as further development outside YBC occurred unless additional parking supply were created there. Some of the spaces in this South-of-Market area are as many as five long blocks from the YBC boundaries.

Construction Activity.

Project construction activities would displace parking from the area, and construction workers would increase demand for parking. Part of the worker-parking demand could be satisfied on-site during a portion of the construction period. However, there would be added demand which would shift to beyond the southerly project limits for walking distances up to 1,000 feet.[12]

Another impact associated with construction would come from trucks removing spoils and bringing in construction materials. During the estimated five months of excavation for the convention center, up to 80 haul trucks (160 trip-ends) per hour could move in and out of YBC (from 9 a.m. to 4 p.m.--see Sections VII. F. and VII. H.). Depending on the intensity of development at any other time, there could be approximately 700-800 truck movements (trip-ends) per day to and from the construction sites at a rate of up to 120 trip-ends per hour. Figure 38, page 349, shows the expected construction vehicle routes.

The construction managers for the convention center have proposed (to DPW Traffic Engineering) a system of barriers during construction (R.

Dorais, Turner Construction Co., telephone conversation, December 8, 1977). On the CB-3 borders, they would close 8-foot-wide lanes on Third, Fourth and Folsom Sts., and a 4-to-6-foot-wide lane on Howard St., for up to two years (24 hours a day). Temporary barriers (9 a.m.-4 p.m.) would obstruct an additional lane on each street, outside of the peak hours. Each 24-hour barrier would replace an on-street parking lane (Figure 15, Section V.F, page 135) except for the west side of Third St., where there is a peak-hour towaway zone, and for an approach lane segment on the south side of Howard St. on the approach to the Howard/Fourth St. intersection, where there is a 7 a.m.-6 p.m. towaway zone. With these exceptions, the 24-hour barriers would therefore not impede the flow of traffic. On the Third St. side, peak-15-minute headway at the Third and Howard intersection is now 4.3 seconds. The loss of the lane due to the 24-hour barrier would reduce this headway to 3.9 seconds (a 10% loss of capacity), still within the 3.6 second guideline headway for Level of Service "D". The Fourth and Howard intersection also would remain within Level of Service "D" (peak-15-minute headway would change from 3.4 to 3.1 seconds, within the 3.0 second guideline headway for Level of Service "D"). The temporary barriers, in effect outside the peak hours, would be affecting lower traffic volumes, and would not make Levels of Service worse than "D" at the four involved intersections.

Variations on Alternatives

The impacts previously presented in this section have been based on the basic alternatives described in Section IV. Potential variations within the alternatives will be addressed in terms of the effects the variations have on the impacts previously discussed. For each applicable variation, the respective loss or gain in daily trip-ends for 1988 has been calculated and compared to the total daily trip ends (1988) for each corresponding alternative.

Alternative A. Variations applicable to this Alternative are the following:

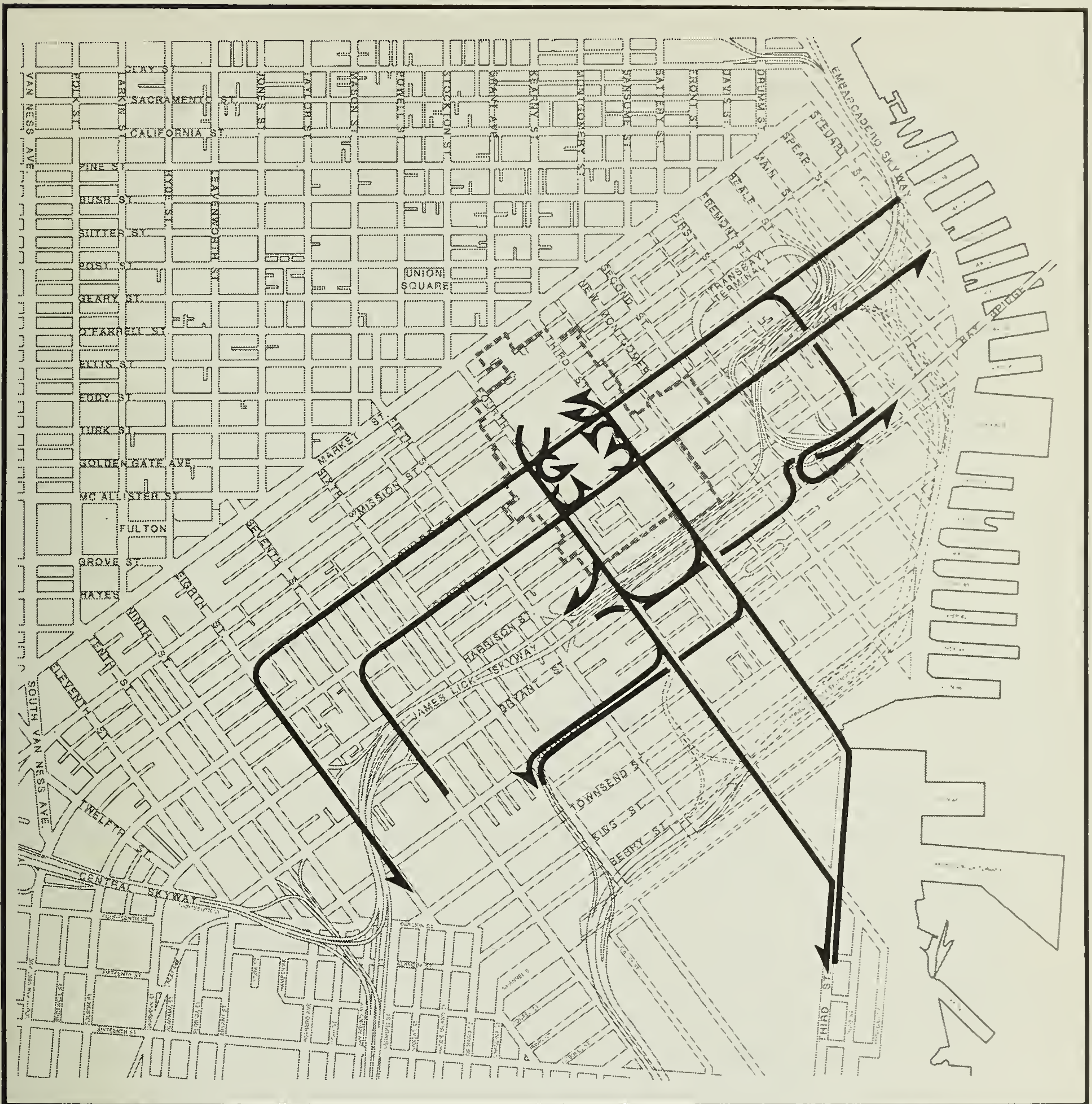
- Recreation/entertainment park instead of public park (CB-3)
- No convention center
- Convention center above ground
- 1,000 hotel rooms instead of 700 hotel rooms
- Increased institutional uses
- The use of people movers
- Reduced off-street parking

TABLE 56

PARKING SUPPLY AND DEMAND -- NUMBER OF SPACES IN PROJECT AREA

	EXISTING		ALTERNATIVES - 1988 A	B	C	D
Supply*	5,800	On-Street:	800+	800+	800+	800+
		5th & Mission:	280	280	280	280
		Other Public:	1,260	1,250	--	--
		Private:	3,085	2,030	1,850	3,830
		TOTAL (Rounded)	5,400	4,400	2,900	4,900
Demand	5,410**	YBC uses only:	10,200	6,400	2,000	9,000
Deficiency	FULL***	YBC uses only:	4,800	2,000	---	4,100

*On and off-street.
**Observed usage, July 1977, weekday afternoon, between 1 and 4 p.m., by EIR Team (TJKM). December demand would be expected to be higher.
***Actual existing demand could be higher than shown, since the area is "full" (greater than 85% occupancy). That is, it is a traffic engineer's rule of thumb that at full demand, about 15% of the spaces are represented by autos entering the lot (garage) or departing.
+Approximate.



LEGEND

⟵ Likely truck flow

0 — 0.5 Kilometer

0 — 1800 Feet

N

TRUCK HAUL ROUTES	38

In terms of daily trip-ends, recreation/entertainment park use would generate about 10 times as many daily trip-ends per square foot as would public park use. A large proportion of the recreation/entertainment park trip-ends and all of the public park trip-ends would be "secondary" (secondary trips are trips made initially [primarily] to one land use in an area and subsequently extended to another use in the area) and are not viewed as producing "new" impacts, except as increases in pedestrian volumes near the park(s). The area of public park available (CB-3 only) is smaller than the "small" recreation/entertainment park projected in Alternative B. The proponent of the recreation/entertainment park (R. Gryziec, telephone conversation, September 8, 1977) has stated that it would not be feasible to put it on a single block, such as CB-3. To provide the area of the "small" recreation/entertainment park would require the addition of about two-thirds of CB-2, i.e., replacing the commercial/entertainment/office/hotel uses in the western third of that block with recreation/entertainment park. The effect would be to reduce generated traffic from CB-2 by more than the increase from CB-3. The net effect would be less generated traffic from this variation.

The convention center would be responsible for approximately 32% of the daily person trip-ends in Alternative A and 50% of the daily person trip-ends in Alternative B. The convention center would also be the largest single attractor/generator projected for YBC. If the convention center were not built and no new uses were to replace it, new travel in YBC would decrease by approximately the above proportions. Development of office and retail commercial uses in CB-3 would reduce this effect. However, both office and retail-commercial uses would generate daily trip-ends at rates below the peak convention center rate.

An increase in the number of hotel rooms (by 300 rooms) would produce a 1% increase in daily person trip-ends over those previously calculated for Alternative A. This change would not affect impacts, within the expected accuracy (±10-15%) of the traffic-generation projections (see Appendix F).

Institutional uses would generate traffic at a rate of 25 daily person trip-ends per 1,000 square feet of gross floor space (See Table F-1, Appendix F), which is approximately equivalent to the rate at which retail/commercial uses would generate traffic. The effect of increasing the amount of project area for institutional uses would depend on the type and density of original land use replaced (See Table F-1, Appendix F).

If the convention center were built above ground (either partially or wholly), there would be no effect on Alternative A daily trip-ends as only the public park use would be affected (for Alternative A, all of the public park trips have been assumed to be secondary). Such action would affect Alternative B, as loss of the surface area in CB-3 would probably preclude the construction of the recreation/entertainment park.

The use of people movers in YBC would be applicable in areas with a high level of "through" pedestrian activity (i.e. people travelling through an area without stopping along the way) as such devices would increase the carrying capacity of the walkway. People movers would be expected to be used only where space is also available to provide a normal walkway, as pedestrians not using the people mover would need access to adjacent land uses. The pedestrian concourse would provide such space where the existing sidewalks would not.

Reducing the amount of off-street parking would have an indirect effect upon travel in YBC. Some trips would not be made because of the inconvenience caused; other trips would spread over time because of the increase in walking distance resulting from having to park outside YBC and the increase in cost that might occur for the available spaces nearby. A reduction in parking might result in a transfer of an indeterminate number of trips from private autos to transit.

Alternative B. Variations affecting Alternative B (and not already addressed) are as follows:

- o Public park instead of recreation/entertainment park.
- o No apparel mart in CB-2.
- o Construction of the apparel mart in EB-2.
- o Variation of the recreation/entertainment park uses.

The effect of replacing the public park with a recreation/entertainment park has been discussed in Alternative A. Conversely, replacing the recreation/entertainment park in Alternative B with a public park would reduce the primary trip-ends from that area to zero. The reduction in travel would be approximately 7% of the Alternative B 1988 daily person trip-ends.

Having no apparel mart in CB-2 would result in an approximate reduction in daily person trip-ends of 4% for Alternative B (and 2% for Alternative A). Expanding the recreation/entertainment park in place of the apparel mart would reduce the effect, so that daily person trip-ends would be approximately 2% less in Alternative B (1% less in Alternative A). Changes of this scale would not be statistically significant in the context of the ±10-15% accuracy of the overall traffic level estimates. Replacing the apparel mart with a public park would not statistically alter the loss in travel resulting from removing the apparel mart, as the public park would not generate primary trips.

If the apparel mart were constructed in EB-2 (replacing the office/retail uses there in the basic alternative), the resulting change in travel would be an approximate reduction in daily person trip-ends of 9% for Alternative B (4% for Alternative A). Expansion of the recreation/entertainment park would reduce this effect.

<u>Alternative C.</u> Variations relevant to this Alternative are the following:

- o Construction of the convention center in CB-3.
- o Construction of the recreation/entertainment park.
- o Increased institutional uses.

o Additional neighborhood commercial activity.

Most of the above variations have been discussed with respect to Alternatives A and B. The same types of increased daily trip-end effects would occur for Alternative C if the convention center or recreation/entertainment park were built, or if the intensity of institutional use were to increase. The magnitude of the change is the most relevant factor for Alternative C since the projected generation of daily trip-ends for basic Alternative C is small compared to that for Alternatives A and B. Construction of the convention center alone would result in an increase in daily person trip-ends of approximately 160%. Construction of the recreation/entertainment park alone would increase the daily trip-ends by approximately 10%. Construction of both would result in an approximate increase in daily trip-ends of 170%. Increased institutional uses would result in the same trip generation effect as for Alternative A; as the daily trip-ends from basic Alternative C are 22% of those for Alternative A, the increase in use would be magnified proportionately.

Additional neighborhood commercial activity would have mixed effects on Alternative C. Possible reduction in YBC travel would result as residents would have retail activity within walking distance. An increase in the demand for short-term on-street parking could occur as a result of this local retail activity.

Alternative D. One variation not previously discussed remains relevant for Alternative D; that is:

o Construction in CB-2 of the hotel and the apparel mart.

Replacing the proposed Downtown Support uses in CB-2 with the hotel and the apparel mart would result in an increase of approximately 3% in daily person trip-ends. The "hotel" is here taken to include the office space and the enclosed commercial/entertainment space associated with it in the western half of the block (in Alternative A).

FOOTNOTES

[1]San Francisco Downtown Parking and Traffic Survey (DPATS, 1970), Department of Public Works.

[2]Fruin, J. J., 1971, Pedestrian Planning and Design, Metropolitan Association of Urban Designers and Environmental Planners, New York, N.Y.

[3]Transportation Conditions and Trends, 1976, San Francisco Department of City Planning.

[4]Muni Metro data from conversation with G. Cauthen, Senior Civil Engineer, S.F. Municipal Railway, August 19, 1977.

[5]T. Standing, Junior Civil Engineer, G. Cauthen, Senior Civil Engineer, S.F. Muni, August, 1977.

[6]BART Impact Program Traffic Survey Series, A-48, April, 1977, Institute of Transportation Studies, University of California, Berkeley.

[7]Board of Supervisors' Resolution 240-76 (1976).

[8]Data from G. Pera, Southern Pacific Railway, September 8, 1977.

[9]J. MacArthur, HOK (convention center architects), telephone communication, November 10, 1977.

[10]Estimate (telephone communication) from L. Kubik, Greyhound Exhibit Drayage Co., November 10, 1977.

[11]Officer Martindale, Taxicab Detail, S.F.P.D., September 23, 1977, telephone conversation.

[12]Some union contracts limit walking distance and would require worker parking on-site. With respect to the convention center: Turner Construction Co., the construction management firm, does not permit parking by construction workers on-site while a project is underway.

G. CLIMATE AND AIR QUALITY

1. CHANGES IN LOCAL CLIMATE

Changes in local climatic patterns would occur in the vicinity of YBC under all of the alternative development plans. Changes in local surface wind patterns would result from the effects of buildings on wind flow. The interactions of local wind patterns with high-rise structures are complex; without actual building layouts and designs, estimated effects can only be speculative. Building height, shape, bulk, width, orientation, surface treatment, and location with respect to other structures affect winds. Generally, taller buildings result in higher wind speeds and more turbulent wind flows than lower ones. Buildings located in close proximity to one another can channel the wind flow (much as when a wind flows through a valley) and can result in gusty winds of variable directions, especially at building corners.

A study of the central block area for the 1973 YBC EIR[1] concluded that winds from the south would generally have the highest speeds (during winter storms); northwest winds (most of the year) would generally have the lowest speeds. Turbulence levels near buildings would generally be more of a problem with west winds than those with any others, as west winds are the most frequent in YBC in all seasons (Table G-3, Appendix G).

Local winds would generally be more turbulent for Alternatives A, B, and D, and the Redevelopment Agency November 1977 tentative proposal (more and taller buildings) than for Alternative C, which proposes that two of the three central blocks be developed as a park. Because of the proposed highrises, gusty winds, especially around building corners, would be likely to be more frequent during the windy spring and summer months than they are at present.

Turbulence and wind speed are of concern because of their effects on: (a) ability of pedestrians, especially the elderly and the handicapped, to walk in the area; (b) exposure to blowing litter and dust;

(c) pedestrian discomfort due to wind chill; and (d) local dispersion of pollutants. Seasonal pedestrian comfort with respect to precipitation would generally be similar to that under the existing conditions described in Section V.G.

Shadow patterns in YBC would depend on the final locations, designs and heights of buildings in the four alternatives. Shadow effects would change with the daily and seasonal intensity and frequency of sunshine, and with the varying sun angles. Generally, areas experiencing frequent winds and shadows would have higher pedestrian discomfort than those areas with shelter from the wind and with more sunlight. As YBC development occurred, urban design review by the Redevelopment Agency and its design consultant, Skidmore Owings & Merrill (SOM), would be expected to consider shadowing effects, particularly for proposed highrises. Of special importance would be the potential shadowing of the park area in CB-2 (Alternative C) and CB-3 (Alternatives A and C and perhaps the Redevelopment Agency tentative proposal), of the recreation/entertainment park in CB-2 and CB-3 (Alternative B and the Redevelopment Agency tentative proposal if this component were adopted), and of the pedestrian concourse in Alternatives A, B and C and in the Redevelopment Agency tentative proposal. Also of concern would be off-site (out of YBC) shadows cast by proposed high rises on the periphery, and on-site shadows cast on any potential plazas, or landscaped areas of individual parcels.

2. AIR QUALITY AND CONSTRUCTION ACTIVITIES

Construction activities--chiefly excavation--would affect air quality in the vicinity of YBC by creating suspended particulates (dust). Construction activities would be expected to occur over a ten year period, but might take longer. If the former occurs, air quality impairment could be more severe at some times, because more construction could be going on. The level of construction activity would vary in intensity with each alternative. In CB-3, excavation for the convention center would occur in Alternatives A and B (starting in 1978), while less excavation (if any)

would occur for Alternative C, which has a park in that block. Alternative D, in which existing zoning would dictate use, would probably result in foundation excavation in that block, most likely after 1980.

For buildings of approximately equal height, excavation would be proportional to land coverage by proposed buildings.[2] On that basis, Alternative A would require the most excavation (at total buildout), Alternatives B and D and the Redevelopment Agency tentative proposal somewhat less, and Alternative C the least.

The quantity of dust emissions which would result from construction operations is proportional to the area of land being worked and the type and level of construction activity. Most emissions from construction would be produced by earth moving (site preparation); they would vary in intensity as different phases and operations of construction were begun and completed.

<u>Convention Center (1980)</u>

Construction of the convention center, in Alternatives A and B, is expected to take 30 months.[3] This includes excavation of the site (approximately 11 acres), expected to take five months. Approximate emission factors for earth moving have been developed by the Environmental Protection Agency.[3] Suspended particulate emission factors range from 1.2 to 1.4 tons per acre per month of active construction.

Particulate emissions associated with excavation of the approximately 11-acre convention center are expected to range from 13 tons per month to 15 tons per month. For an average work month of 22 days, 0.6 to 0.7 tons per day would result from excavation of the convention center site. This would mean that local particulate concentrations averaged over a 24-hour period would range from 7,300 ug/m^3 (micrograms per cubic meter) to 8,500 ug/m^3. These levels would exceed federal and state community standards for suspended particulates. Concentrations for the 8-hour period of work would be expected to be higher than the 24-hour concentrations; i.e., 22,000 ug/m^3 to 26,000 ug/m^3. There are no standards for the eight-hour period.

Trucks hauling excavated material from the site could raise particulate levels on haul route roadways and surrounding areas, because of spillage and wind-blown dirt.

Full Development (1988)

As information concerning excavation associated with construction at full development is not available, no estimates of particulate levels for this period can be made. On a per-block basis, excavation emissions would generally be less than those for the convention center.

3. AIR QUALITY IMPACTS AFTER DEVELOPMENT

The air quality impacts of the alternatives following development include the effects of vehicular emissions: (a) on regional air quality, particularly oxidant formation; and (b) on local pollutant concentrations, primarily of carbon monoxide. In addition to mobile source emissions, fuel combustion emissions associated with building heating and cooling would affect local air quality.

a. Mobile Source Analysis[4]

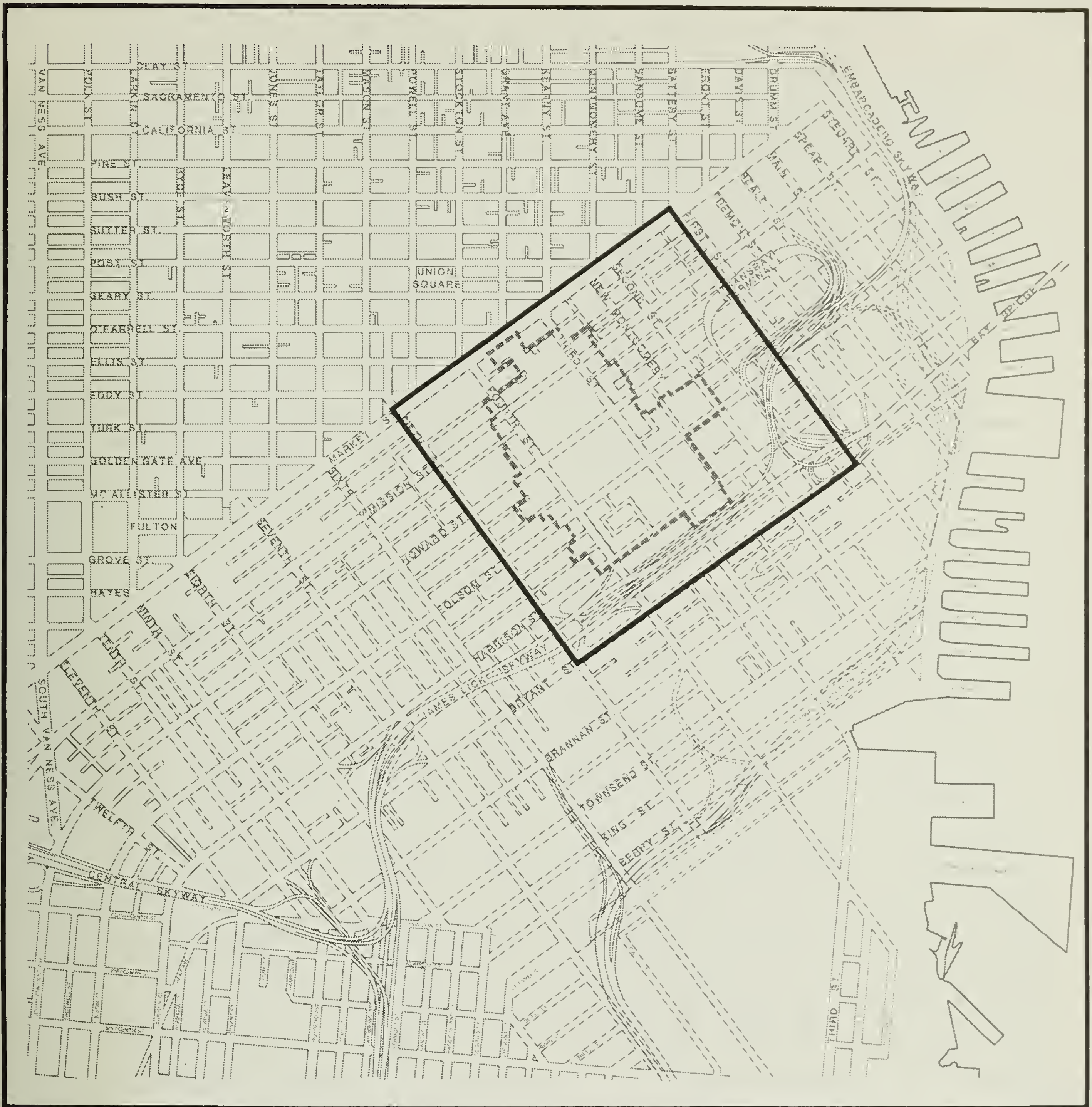
The analysis of air quality impacts attributable to mobile source emissions follows the approach suggested by the BAAPCD,[5] taking into account: (a) emissions from vehicles traveling at speed on the streets and (b) those from vehicles idling on streets and in parking areas. Carbon monoxide (CO), hydrocarbons (HC) or "organics" (includes methane, which does not contribute to smog formation), sulfur oxides (SO_x--sulfur dioxide (SO_2) plus sulfur trioxide (SO_3)), nitrogen oxides (NO_x--nitric oxide (NO) plus nitrogen dioxide (NO_2) plus others) and suspended particulates (SP) have been evaluated with the BAAPCD methodology.[6] It should be noted that standards apply to non-methane hydrocarbons (not total HC or total organics), SO_2 (not SO_x), and NO_2 (not NO_x). Mobile source contributions to YBC area air quality have been calculated for existing

conditions in 1977 (Base Year 1977), Base Year 1980 (without further YBC development), Base Year 1988 (without further YBC development) and the four alternatives in 1980 and 1988. The base year concept assumes traffic in the YBC area will increase in future years, independently of YBC development. In analysis of each alternative, base year traffic within YBC is added to the net increase in traffic estimated to be produced by the alternative. Thus the mobile-source pollutant concentration estimates for each alternative in the 1980 and 1988 time frames include the base estimates.

The BAAPCD methodology emphasizes the "relative contributions of project emissions to the degradation of air quality." The term "project emissions" refers to the extra mobile source emissions produced in the surrounding one-kilometer square area (Figure 39) by any one of the four alternatives. The one-kilometer-square area is defined as that area between Market St. and Bryant St. inclusive, and between Fifth St. and the approximate vicinity of First St. (First St. traffic is not included). The analyzed streets within the one-kilometer square area are listed in Table G-8, Appendix G. The BAAPCD "area-contribution" methodology is based on 24-hour emissions, modified (by BAAPCD formula) for other averaging times.

b. Mobile Source Impacts / YBC Area

Pollutant concentrations due to mobile sources for 1977 (including current YBC contributions), Base Years 1980 and 1988, and the four alternatives for 1980 and 1988 are presented in Table 57. As can be seen in that table, mobile source pollutant concentrations for the base years generally are lower (because of the increasing fractions of autos with improved emission controls) in 1980 and 1988 than the existing (1977) levels. The existing (1977) levels are calculated, and based on existing YBC area traffic only. They are presented for comparison of the effects of mobile sources only. In this section, discussion of violations of air quality standards is preliminary, as the impact of stationary sources would add to levels of some pollutants. Concentrations in this section are not



LEGEND

Boundary of one square kilometer analysis area

0 0.5 Kilometer

0 1800 Feet

N

AIR QUALITY ANALYSIS AREA	39

TABLE 57: SUMMARY OF MOBILE SOURCE CONCENTRATIONS, YBC AREA (1 sq. km--0.39 sq. mi.--250 acres)

POLLUTANT	1977	1980 BASE YEAR	1980 A	1980 B	1980 C	1980 D	1988 BASE YEAR	1988 A	1988 B	1988 C	1988 D
CARBON MONOXIDE (CO)											
Max 1-hr conc (ppm) (Std 35 ppm)	11.3	10.7	15.5	15.5	13.4	13.4	10.8	19.9	17.2	14.1	19.2
Max 8-hr conc (ppm) (Std 9 ppm)	6.5	6.0	8.9	8.9	7.6	7.6	6.2	11.5	9.7	8.2	11.3
HYDROCARBONS (HC)											
Max 3-hr conc (ppm) (Std 0.24 ppm)*	2.1	1.2	1.8	1.8	1.6	1.6	1.2	1.9	1.8	1.5	1.9
SULFUR OXIDES (SO_x)											
Max 1-hr conc (ppm) (Std .50 ppm)**	0.05	0.05	0.07	0.07	0.06	0.06	0.06	0.09	0.08	0.07	0.09
Max 24-hr conc (ppm) (Std .05 ppm)**	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.04	0.03	0.03	0.04
Avg 1-yr conc (ppm) (Std .03 ppm)**	0.004	0.004	0.005	0.005	0.005	0.005	0.004	0.007	0.007	0.006	0.007
NITROGEN OXIDES (NO_x)											
Max 1-hr conc (ppm) (Std 0.25 ppm)***	0.93	0.62	0.81	0.81	0.75	0.75	0.48	0.67	0.64	0.60	0.65
Avg 1-yr conc (ppm) (Std .05 ppm)***	0.12	0.08	0.10	0.10	0.09	0.09	0.06	0.08	0.08	0.07	0.08
SUSPENDED PARTICULATE (SP)											
Max 24-hr conc (ug/m^3) (Std 100 ug/m^3)	51.	45.	60.	60.	54.	54.	35.	57.	51.	45.	57.
+Avg 1 yr conc (ug/m^3) (Std 60 ug/m^3)	18.	16.	21.	21.	19.	19.	12.	20.	18.	16.	20.

NOTE: All entries represent YBC concentrations.
*Standard is for non-methane hydrocarbons.
**Standard is for SO_2.
***Standard is for NO_2.
+Annual Geometric Mean. The nth root of the product of "n" measurements.

related directly to the reported measured concentrations of Section V.G. The concentrations could increase if improvements in vehicle emission controls do not occur as anticipated. Vehicle emission controls refer to devices on automobiles to reduce the amounts of emissions. The federal Environmental Protection Agency has set specific allowable per-mile emission rates for future years and has required auto makers to equip new automobiles with devices to meet EPA emission standards. The calculations in this EIR are based on the emission values in the 1975 BAAPCD guidelines, modified by recent revisions in EPA base data ("Supplement 8") and recent changes in California NO_x emission control requirements (see Appendix G, Part 2, for details).

1) Existing and Base Year Air Quality (Mobile Sources)

Existing (1977). Table 57 shows that for the pollutants and periods shown, HC and NO_x (both of which can be used to estimate the potential for oxidant formation) produced by mobile sources in the YBC area are estimated to be exceeding applicable standards. (Calculated NO_x concentrations are above NO_2 standards--see pages 369 and 377 for explanations of the significance of the NO_x/NO_2 relationship.) CO, SO_x and SP produced in YBC by mobile sources are estimated to be below standards. Actual concentrations of SO_2 in San Francisco have occasionally been exceeding standards (Section V.G). The infrequent violations are believed to be associated with easterly winds (which occur about 0.5% of the time), carrying sulfur dioxide to San Francisco from the petroleum refineries in the East Bay and Benicia.

1980. Estimates for Base Year 1980 show the following declines from 1977: CO:5-8%; HC:43%; SO_x:0%; NO_x:33%; SP:11-12%. The pollutant declines occur in spite of an increase in the average daily traffic volumes over the one-kilometer square between 1977 and Base Year 1980. This is the result of the higher proportion of vehicles with improved emission controls expected to be on the road in 1980. HC levels would continue to exceed the standard; NO_x levels would continue to exceed the NO_2 standards (see page 377 for significance).

1988. NO_x and SP pollutant concentrations show a continuing decline from Base Year 1980 to Base Year 1988. NO_x drops by another 23-25%; SP by another 22-25%. As with Base Year 1980, these declines in concentration are expected to be the results of a vehicle mix having still tighter emission controls. The trend in increased traffic volumes would remain similar to that for Base Year 1980, with 1988 Base Year traffic volumes in the YBC area estimated to increase about 20% over 1977. Concentrations of the other pollutants generally would remain unchanged from Base Year 1980 to Base Year 1988. For these, reductions in per-mile emissions are matched by increased traffic volumes. HC and NO_x would continue over standards.

2) Alternative A (Mobile Sources)

1980. Alternative A provides for the completion of the convention center and of the committed housing for the elderly, and renovation of the Mercantile Building by 1980. Traffic projections upon which mobile source emissions and concentrations are based reflect primarily the increase in traffic attributable to the convention center. Table 57 shows about a 51% and a 48% increase in CO levels over Base Year 1980 for the one-hour and eight-hour averaging times, respectively, but levels would remain below standards. HC would increase 0.6 ppm (50%) over Base Year 1980. Although the 1980 concentrations are less than those calculated for 1977, the HC levels still would exceed standards. While SO_x levels would rise by 25-50% over Base Years 1977 and 1980, depending on the averaging times, they would be expected to remain below standards. NO_x would increase 25-31% over Base Year 1980 and would remain above NO_2 standards (see page 377 for significance). SP levels would increase by 31-33% over Base Year 1980 levels, but would remain below standards. The Redevelopment Agency tentative proposal in 1980 would have the same development as Alternative A and would produce the same levels of mobile source emissions.

1988. Table 57, page 363, shows the NO_x and SP concentrations for Alternative A-1988 to be lower than those estimated for

Alternative A-1980. This decrease would occur despite the fact that generated traffic would more than triple that of Alternative A-1980. NO_x would remain above NO_2 standards (see page 377 for significance). SP would remain below standards. Levels of the other pollutants would be higher than those for Alternative A-1980, and would be 33-100% higher than the Base Year 1988 values. CO levels would exceed the eight-hour standard, HC levels would exceed the HC standard. During morning and evening peak hours, traffic volume increases could lead to more idling time, resulting in higher localized roadside CO concentrations. Increased concentrations would vary with the street and would be short-term in nature. Without traffic mitigation measures, the largest such impact in the p.m. peak for the intersections analyzed in Section VI.F would be in the vicinity of Fourth at Market (p.m. peak 15 minutes), where the actual mixed-vehicle headways would be smallest relative to the guideline headways. If the Redevelopment Agency tentative proposal included a public park and office/commercial/entertainment/hotel uses in the central blocks, pollutant levels would be intermediate between the levels estimated for Alternatives A and B.

3) Alternative B (Mobile Sources)

1980. Alternative B, although different from Alternative A in the land uses projected for 1988, also provides for the convention center (and the elderly housing and the Mercantile Building) in 1980, and would have mobile source emissions similar to those of Alternative A in 1980.

1988. Less office space and more housing in Alternative B (compared to Alternative A) means that fewer people would be commuting to work; this would result in lower traffic volumes than under Alternative A. This change is reflected in lower CO levels, as well as in lower levels of HC, NO_x, SO_x and SP. CO levels would exceed the eight-hour standard. The other standards violated under Alternative A would be violated under Alternative B also, as they would be for Base Year 1988. If a recreation/entertainment park were provided in the Redevelopment Agency tentative proposal, the amount of office space would be similar to

that provided in Alternative B; 35% more retail/commercial space would be provided than in Alternative B. Because commercial uses generate less than 10% of the total traffic volumes in Alternatives A and B, the additional commercial space in the tentative proposal would generate about 3.5% more traffic than in Alternative B. As the office space is similar, the resulting YBC-generated mobile source emissions would be similar to (less than 5% greater than) those estimated for Alternative B.

4) Alternative C (Mobile Sources)

1980. The new uses projected in 1980 for Alternative C are the renovated Mercantile Building at Third and Mission Streets and new elderly subsidized housing in the southwest corner of YBC. Without the convention center, lower YBC traffic volumes (about 35% less than in Alternatives A and B) have been estimated. The effects can be seen in the lower CO levels of Alternative C, as compared to Alternatives A and B. Similar effects apply to the other pollutants.

1988. The increase in housing, the absence of a convention center and the further reduction in office space below that of Alternative B are the major factors producing lower traffic volumes in Alternative C. This is reflected in the lower pollutant concentrations for Alternative C as compared to Alternatives A and B. CO standards would not be violated by YBC mobile sources. The other standards violated under Alternative A would be violated under Alternative C also, as they would be for Base Year 1988.

5) Alternative D (Mobile Sources)

1980. Alternative D projects the same uses for 1980 as Alternative C. Therefore traffic volumes for Alternative D are the same as for Alternative C. Since traffic volumes do not change, mobile source pollutant levels are the same for Alternative D as for C.

1988. Pollutant levels in Alternative D attributable to mobile sources are statistically equivalent to those for Alternative A. The extra downtown support uses in Alternative D generate traffic (daily auto trips) at about the same rate as the convention center in Alternative A.

c. Stationary Source Analysis

The analysis of stationary source emissions within YBC focuses on emissions generated by space heating and cooling associated with the land use mix in each alternative.

The analysis of stationary source emissions attributable to space heating and cooling follows the techniques suggested by the Environmental Protection Agency.[7] The EPA technique estimates the fuel combustion emissions based on the developed square footage, fuel use type (gas or oil) and fuel combustion emission factors.[8] The estimation of fuel combustion emission is based on fuel use estimates developed in Section VI.I (Resource Use Impacts).

The energy consumption estimates and resultant emission estimates were developed for generalized use categories. A summary of total fuel combustion emissions (emissions of use types listed in Table G-9, Appendix G, summed for existing 1977, and for each alternative in 1980 and 1988) is presented in the following subsection. These emissions can be compared to the total emission estimates for the same use categories (not including power plants) for San Francisco as a whole in 1980 and 1988.

d. Existing and Alternative Stationary Source Fuel Combustion Emissions

1) Existing YBC, 1977 (Stationary Sources)

Table 58 shows that existing stationary source emissions in the YBC area are generally less than 1% of the total San Francisco stationary source

TABLE 58

SUMMARY OF STATIONARY SOURCE FUEL COMBUSTION EMISSIONS (TONS/DAY) FOR YBC REDEVELOPMENT AREA (ANNUAL AVERAGES)

SCENARIO	SP	SO_2	CO	HC	NO_X
YBC Existing-1977	0.003	0.0001	0.004	0.002	0.020
+San Francisco-1977 Base Year	1.1	0.81	0.6	0.10	6.5
Alternative A-1980	0.004	0.016	0.004	0.002	0.024
Alternative B-1980	0.004	0.016	0.004	0.002	0.024
Alternative C-1980	0.002	0.0001	0.003	0.001	0.019
Alternative D-1980	0.002	0.0001	0.003	0.001	0.019
+San Francisco-1980 Base Year*	1.3	1.9	0.6	0.15	7.5
Alternative A-1988	0.032	0.29	0.012	0.007	0.093
Alternative B-1988	0.013	0.11	0.007	0.004	0.05
Alternative C-1988	0.004	0.016	0.005	0.002	0.03
Alternative D-1988	0.031	0.27	0.012	0.007	0.097
+San Francisco-1988 Base Year*	1.5	1.2	0.7	0.15	8.0

+Note that emissions for San Francisco are for fuel combustion (heating and cooling) and not total emissions from all uses or sources.
*Source: BAAPCD, Base Year Emissions for 1980 and 1988, Modeled results obtained from N. Flynn, Air Pollution Engineer, August 15, 1977.

Note: The base year emissions presented here are San Francisco totals. These values were prorated from projected District-wide emission totals, assuming a constant ratio of San Francisco to District emissions in future years--confirmed by N. Flynn, BAAPCD.

fuel combustion emissions. Total hydrocarbons (including methane) from YBC are about 2% of the San Francisco total from all sources. (This 2% figure may be artificially high, in that the BAAPCD San Francisco data show no production of hydrocarbons from non-industrial stationary-source fuel combustion.) Nitric oxide (NO) is the pollutant emitted in the highest levels from current YBC fuel use. Although natural gas, the principal fuel being used by existing structures, is a relatively clean-burning fuel, nitric oxide is the major pollutant from natural gas combustion. (Nitrogen-containing stationary source emissions are reported as total oxides of nitrogen [NO_x], consisting mainly of NO and NO_2. However, sulfur-containing stationary source emissions are reported as SO_2.) YBC NO_x makes up about 0.3% of the San Francisco total.

2) <u>1980 (Stationary Sources)</u>

<u>Alternative A, 1980</u> Table 58 shows that Alternative A stationary source emissions range up to 160 times the values shown for existing YBC emissions. The increases would be due primarily to the convention center; the 160-fold increase in SO_x emissions would be attributable entirely to fuel oil combustion emissions from the convention center.

<u>Alternative B, 1980</u> Alternative B, although different from Alternative A in the land uses projected for 1988, also provides for the convention center in 1980 and thus would produce the same stationary source emissions as Alternative A in 1980, as would the Redevelopment Agency tentative proposal.

<u>Alternative C, 1980</u> Emissions in Alternative C are less (no convention center) than those in Alternatives A and B and also less than or equal to the existing 1977 emissions. This is attributable to the assumption that existing older buildings would be improved (with respect to fuel conservation) by 1980 (Section VI.I) so that emission rates from them would be lower in that year. (The estimated "existing" rates are based on 1975 emisson factors, the latest available.)

Alternative D, 1980 Alternative D projects the same land use for 1980 as Alternative C. Since the uses do not change, the stationary source emissions are the same for Alternative D as for Alternative C.

3) 1988 (Stationary Sources)

Alternative A, 1988 Table 58, page 369, shows that Alternative A stationary source emissions of SP and SO_x would be the highest of all the alternatives. The higher SP and SO_x levels are attributable mainly to the large office buildings proposed in Alternative A. The Redevelopment Agency tentative proposal, with central-block development similar to that proposed in Alternative A and housing replacing some office and commercial space proposed in Alternative A, would have stationary source emissions intermediate between those of Alternatives A and B.

Alternative B, 1988 Fuel combustion emissions for all pollutants would be less than those of Alternative A. This would be the result chiefly of less office space (reduction of about 50%) in Alternative B. If the Redevelopment Agency tentative proposal were to include a recreation/entertainment park, the office space would be similar to that provided in Alternative B, with similar stationary pollutant emissions.

Alternative C, 1988 Fuel combustion emissions in Alternative C would be the lowest for all alternatives. This would be attributable chiefly to further-reduced office and retail space and less light industry in C than in A or B, and a park instead of the convention center.

Alternative D, 1988 Emissions in Alternative D would be greater than in Alternatives B or C due to the more-intensive use projected for D. Emissions for Alternatives D and A are essentially the same (within 7% of each other). NO_x is the only pollutant for which Alternative D production is higher than that of Alternative A (by 4%).

e. Total YBC Pollutant Concentration Analysis

The results of the forecasting procedures and models are best viewed as estimates of air-pollution potential, rather than actual concentrations expected in future years. Again, the results in this subsection have to do with "local-area contributions" averaged over a one-kilometer square, and not with roadside concentrations and concentrations at sensitive receptors (BAAPCD 1975 Guidelines).

The "Mobile + Stationary" columns of Table 59 present the summation of the total mobile-source concentrations (for 1-km^2) plus stationary-source contributions generated by the YBC redevelopment area (87 acres) plus stationary-source contributions for the balance of the one-kilometer-square area (additional 140 acres). (Stationary source emissions (in tons per day for the one-square kilometer area) are converted to concentrations by the same BAAPCD guideline method used for mobile sources. Current and projected (base year) concentrations for San Francisco (at the BAAPCD monitoring station) also are shown in that table. They are presented for comparison with that portion of future YBC area concentrations estimated to be attributable to mobile and stationary sources which would be located in the one-kilometer-square area, and are not additive to those YBC concentrations.

It is recognized that a background concentration must be added to each computed "Mobile + Stationary" concentration in Table 59. This is because additional pollutants would be entering the one-kilometer square from upwind sources. The basis for this addition is discussed in Appendix G, Part 2. The result is that for suspended particulate, 35 micrograms per cubic meter (ug/m^3) are to be added to the locally generated 24-hour concentration; for all other pollutants, 27% of the locally generated concentration is to be added to each.[9]

TABLE 59: SUMMARY OF COMBINED SOURCE (MOBILE PLUS STATIONARY) CONCENTRATIONS, YBC AREA
(1 sq.km.--0.39 sq.mi.--250 acres)

POLLUTANT	1977 Base Year S.F.	1977 YBC Mobile Plus Stationary***	1980 Base Year S.F.	1980 MOBILE + STATIONARY*** ALTERNATIVE A	B	C	D	1988 Base Year S.F.	1988 MOBILE + STATIONARY*** ALTERNATIVE A	B	C	D
CARBON MONOXIDE CO												
Max 1-hr conc (ppm) (Std. 35 ppm)	19.6	11.3	23.8	15.5	15.5	13.4	13.4	24.3	19.9	17.2	14.1	19.2
Max 8-hour conc (ppm) (Std 9 ppm)	9.8	6.5	11.8	8.9	8.9	7.6	7.6	11.9	11.3	9.7	8.2	11.3
HYDROCARBONS (HC)												
Max 3-hr conc (ppm) (Std 0.24 ppm)	N/A**	2.1	N/A**	1.8	1.8	1.6	1.6	N/A**	1.9	1.8	1.5	1.9
SULFUR OXIDES (SO_x)												
Max 1-hr conc (ppm) (Std .50 ppm) (SO_2)	0.15	0.051	0.47	0.16	0.16	0.061	0.061	0.21	0.67	0.29	0.11	0.67
Max 24-hr conc (ppm) (Std .05 ppm) (SO_2)	0.058	0.020	0.13	0.060	0.060	0.020	0.020	0.082	0.26	0.10	0.045	0.26
Max 1-yr conc (ppm) (Std .03 ppm) (SO_2)	0.011	0.004	0.036	0.012	0.012	0.005	0.005	0.016	0.047	0.023	0.009	0.047
NITROGEN OXIDES (NO_x)												
Max 1-hr conc (ppm) (Std 0.25 ppm) (NO_2)	0.25	1.02	0.25	0.89	0.89	0.83	0.83	0.26	0.82	0.72	0.65	0.82
Avg 1-yr conc (ppm) (Std .05 ppm) (NO_2)	0.033	0.130	0.033	0.108	0.108	0.098	0.098	0.034	0.098	0.090	0.076	0.100
SUSPENDED PARTICULATES (SP)												
Max 24-hr conc (ug/m^3) (Std 100 ug/m^3)	141.	59.8	148.	70.2	70.2	59.3	59.3	163.	90.6	65.5	49.3	90.6
*Avg 1-yr conc (ug/m^3) (Std 60 ug/m^3)	53.	21.1	56.	24.7	24.7	20.8	20.8	61.	31.7	23.1	17.5	31.7

TABLE 59 (continued)

*Annual Geometric Mean--nth root of the product of "n" measurements.
**N/A--Not Available (not measured in San Francisco).
***Mobile Sources for 1-km^2 plus stationary fuel combustion emissions in YBC Redevelopment Area (87 acres) plus emissions from stationary sources outside YBC Redevelopment Area (balance of 1-km^2--140 acres). Mobile source calculations (BAAPCD guidelines) are for SO_x and for NO_x. Stationary source calculations (guidelines plus BAAPCD projections) are for SO_2 and NO_x. The SO_x contribution is primarily from stationary sources, and is mostly SO_2. The standards and the base year values are for SO_2 and NO_2. See discussion, pages 376-377.

Note: Base year levels (existing and projected levels at the BAAPCD San Francisco monitoring station) were not added to mobile/stationary concentrations since levels would in effect be double counted, yielding unrealistically high concentrations. The base year levels are presented for comparison with concentrations attributable to the alternatives. The effects of adding reasonable background levels are discussed in the text.

Combined Source: is defined as a complex of stationary fuel-combustion emissions and mobile source emissions.

Concentrations for 1977 and future base years were computed by taking (for each pollutant and appropriate averaging time) the 1976 recorded concentrations at the BAAPCD monitoring station at 939 Ellis Street and multiplying by the ratio of modeled regional future emissions[10] to recorded regional emissions for 1976.[11] For CO, these were further corrected for the EPA Supplement 8 changes (see Appendix G, Part 2). For NO_x, they were further corrected for the recent ARB corrections (Appendix G, Part 2).

The combined YBC-alternative levels shown in Table 59 follow composites of the trends discussed earlier in detail in mobile source and stationary source analysis sections. The levels shown in Table 59, if compared to those of Table 57, mobile source concentrations (one-kilometer-square area), show that with the exception of SO_x, the major portion of the emissions is from mobile sources rather than stationary sources. For CO and HC, essentially 100% of the total emissions are from mobile sources. For NO_x, the mobile-source contribution is at least 79%, for SP at least 63%. Thus, total concentrations of pollutants other than SO_x are more sensitive to changes in traffic volumes than to those in structures. In 1980, levels for Alternatives A and B and the Redevelopment Agency tentative proposal would be identical (identical development); Alternative C and D levels would be identical to each other and lower, because of the absence of the convention center. In 1988, Alternative A pollutant levels would be the highest. Alternative B-1988, with lower traffic volumes and less-intensive structural development, would have lower pollutant levels. The Redevelopment Agency tentative proposal in 1988 would have pollutant levels intermediate between those of Alternatives A and B. Alternative C-1988, with reduced office space, increased housing (natural gas vs. fuel oil) and the absence of the convention center, would have the lowest pollutant concentrations of all alternatives. Alternative D-1988, with its land use mix, would generate about the same mobile source emissions and about the same stationary source emissions as Alternative A-1988. The totals would be within 2% of each other.

With the 27% background factor added to YBC entries in Table 59 for CO, HC, SO_x and NO_x, and 35 ug/m^3 added to the SP entries, expected violations of standards would be as follows:

The one-hour CO standard would not be exceeded in 1980 or in 1988. The eight-hour CO standard would be exceeded for all Alternatives and both time frames. (The BAAPCD monitoring station (Base Year) would show more frequent violations in 1980 and 1988 than in 1977, in any event.)

HC concentratons are not being measured in San Francisco now. Current and future YBC mobile-plus-stationary concentrations (all alternatives) all exceed standards. Future concentrations are all less than the current levels.

SO_2 standards are now being exceeded on about two days per year in San Francisco. On a Base-Year concentration basis alone, the 24-hour SO_2 standard would be expected to be exceeded more frequently in 1980 and in 1988. YBC-generated concentrations of SO_x would be about the same in Alternatives C and D in 1980 as they are now; in Alternatives A and B in 1980 they would be triple this level, and exceeding standards (SO_x is expected to be predominantly SO_2). By 1988, under Alternatives A, B and D and the Redevelopment Agency tentative proposal, the maximum-episode YBC area 24-hour concentrations of SO_x would be 2.5 to 6.6 times the standard level, leading to frequent violations, particularly for Alternatives A and D. Under Alternative C, the maximum-episode 24-hour SO_x concentration would be about 15% over the standard. This would lead to occasional violations (about two days per year, as at present).

NO_2 standards are now being exceeded about once a year in San Francisco. In 1980 and 1988, under all alternatives, the NO_x one-hour

concentrations in the YBC area would be 3.3 to 4.5 times the standard level (but lower than the present YBC level). There should therefore be no violations due to YBC in future years. The apparent anomaly results from the fact that the calculation procedure overestimates the emissions of NO_2 from stationary and mobile sources. (The BAAPCD guideline method calculates NO_x emitted in automobile exhaust and from stationary sources. The standards pertain to NO_2, as do BAAPCD measurements. NO_2 is about 5% to 10% of the total nitrogen oxides in automobile exhaust [L. Robinson, BAAPCD Director of Planning and Research, September 12, 1977, telephone conversation]. The EIR team air quality consultant, Systems Applications, Inc. (SAI) uses a figure of 5%.)

The 24-hour SP standard is now being exceeded about eight days per year in San Francisco. With the 35 ug/m^3 background addition, this standard would still be exceeded in 1980 under Alternatives A and B, and in 1988 under Alternatives A, B and D. The highest YBC levels (1988 A and D) would be less than the current maximum San Francisco value.

In summary: some of the cited YBC contributions would have the effect of raising the frequency of standards violation. San Francisco Base-year projections (no further YBC development) show expanding violation frequency for CO, SO_2, and SP in any event.

f. <u>Effects of Variations in the Alternatives</u>

Within the limits of accuracy possible in the air quality analysis, the effect of changing one or two components of one of the alternatives would generally be negligible in terms of its effects on forecast air quality averaged over YBC. Such air quality changes would be roughly proportional to the changes in total energy consumption induced by the variation(s) (See Section VI.I, Resource Use Impacts). The largest such effect would come from the addition of the convention center, with or without the recreation/entertainment park, to basic Alternative C, which has the smallest air quality impact of the four alternatives.

With regard to localized (sensitive receptor) impacts (see "Local Effects of Street and Highway CO Sources," following), it can again be said that the effects of variations on air quality would generally be negligible; for example, as shown in the following, worst-case carbon monoxide distributions throughout YBC are dominated by emissions from the James Lick Freeway, which are insensitive to changes in the alternatives. The effects of air quality on sensitive receptors are functions mostly of the locations of such receptors. None of the suggested variations involves changing the location of a sensitive receptor.

4. CARBON MONOXIDE DISPERSION ANALYSIS

YBC-Areawide Analysis[12]

Estimates of carbon monoxide (CO) concentrations attributable to YBC development (existing and all alternatives) were obtained through the use of a "box" model. In this approach a computation was made of the changes in CO into and out of the analysis box. In common application, the "box" is the volume of air over an entire urban region from the ground surface to the height which contains most of the pollutant material. The box contains most or all of the relevant sources. Wind flow entering the box from upwind sites usually has minor or negligible concentrations of the pollutant. The computation accounts for the wind's blowing the pollutant out the downwind faces and may account for dispersion out the top of the box. For this EIR, the "box" was the volume of air over the 1-km^2 analysis area extending from the surface to the top of the mixing area. The air entering the YBC area already contains some CO.

The results of the box model for the base years and for each alternative are shown in Table 60. One output of the box model is the increment to regional values that might be attributable to YBC. This increment would be the change in CO concentration that might be expected from the upwind to the downwind side of the YBC area. It should be noted that the box model sums overall mobile sources within the 1-km^2 area. Almost 100% of all locally generated carbon monoxide comes from

automobile exhaust. The sources used in this computation include base year mobile sources plus sources attributable to further YBC development. Roughly half the CO emissions in the 1-km^2 area originate from traffic on the James Lick Freeway and its exits. Most of the 1-km^2 emissions cannot be attributed to YBC development (base year YBC area traffic dominates total traffic) as shown, for example, by the differences in CO increment between Base Year 1988 and the most-polluting alternative (Alternative A, 1.08 ppm for one-hour average and 0.15 ppm for eight-hour average). The Redevelopment Agency tentative proposal in 1988 would have CO concentration increments intermediate between those of Alternatives A and B, reflecting the traffic volume generated.

Conditions leading to the highest CO for the YBC area as a whole would be with south or southeast winds, which would bring freeway emissions over the area. These wind directions are less frequent than north to northwest winds, which would carry YBC emissions over the freeway. Light-variable (stagnant) conditions could lead to the highest potential local concentrations, along Harrison St. (due primarily to freeway traffic); these cannot be quantified with standard diffusion models. Potential effects of freeway traffic under worst-case winds are quantified following the next subsection.

TABLE 60

CO CONCENTRATION INCREMENTS COMPUTED WITH YBC BOX MODEL
UNDER WORST-CASE METEOROLOGY (In ppm)

Averaging Time	Base Year			Alt. A		Alt. B		Alt. C		Alt. D	
	1977	1980	1988	1980	1988	1980	1988	1980	1988	1980	1988
1 Hour	5.28	5.80	2.96	6.32	4.04	6.32	3.53	5.82	3.33	5.82	4.04
8 Hour	0.79	0.87	0.44	0.95	0.59	0.95	0.52	0.87	0.48	0.87	0.59

Micro-scale-Effects of Carbon Monoxide Dispersion

In the YBC area, and in much of the San Francisco central business district, vehicle exhaust is almost the exclusive source of CO. The maximum concentrations of CO would be observed at ground level in the streets and in parking areas containing the greatest density of operating vehicles. Concentrations decrease by dilution as the wind blows the pollutants away from the source area (dispersion). It should be noted that emissions would be greater during the rush hour period (4-6 p.m.) than for the daily average, and the eight-hour average is likely to be weighted by conditions within this limited period.

In an urban area such as YBC, the CO source distribution is complex (distribution over an interconnected road network); so also are the winds and turbulence that transport, disperse and dilute the CO. Building location and height can affect wind patterns (atmospheric "whirlpools" with vertical and/or horizontal rotation would create local or streetside variation in CO concentration patterns). The building shapes and placements for full development of YBC have not yet been planned in detail. Therefore, in the judgment of the EIR team (Systems Applications, Inc.), specific-location predictions of maximum expected CO concentrations cannot be made. However, the potential ranges of CO concentrations (the maximum and minimum values, in relation to average concentrations) have been estimated. These are shown in Appendix G, Part 2.

Local Effects of Street and Highway CO Sources[13]

The foregoing subsections have dealt primarily with areawide production and spatially averaged concentrations of CO under worst-case conditions. In this subsection, roadside and sensitive-receptor (defined here as existing and potential housing sites) concentrations of CO produced by traffic on the James Lick Freeway and on YBC streets are estimated; the methodology is essentially that of the 1975 BAAPCD guideline approach. As noted earlier, it is not possible to predict CO concentrations accurately in an urban-canyon situation. This analysis is

meant to provide only trends in direction (distance from the freeway) and over time.

Table 61 presents estimates of CO concentrations at the property line (at street corners) for all locations where housing may be built in at least one alternative. The entries are worst-case estimates, in the sense that the BAAPCD guideline approach is based on:

a. Worst-case meteorology (light winds and non-turbulent air)
b. Angle of 22.5 degrees between wind and road (concentrations are highest when wind direction is parallel to road direction, but models break down at or near exact parallelism)
c. Flat-plane geometry (actual ground concentrations would be lower because the freeway is elevated).

The wind direction that would maximize the contribution from the freeway and from the pertinent east/west street, and add a contribution from the pertinent north/south street, is assumed for each street corner. (This is an additional worst-case factor; for all one-hour entries in the table, the dominant contributor is the freeway, rather than the adjacent street. This can be seen from the reduction in one-hour CO levels in any year as one proceeds from the freeway north. Traffic on Mission and Howard Sts. is heavier than that on Harrison and Folsom Sts. During the peak hour, freeway speeds are low, so CO emissions per car are relatively high. Over an eight-hour period, freeway speeds are higher compared to those on city streets; the freeway contribution per car drops, and the freeway becomes less of a dominating influence.) Winds at angles of 22.5 degrees with respect to the freeway, and driving pollutants into YBC, would have to come from the south-southwest or the east-northeast; these are infrequent directions.[14]

Potential concentrating effects of the urban-canyon geometry have not been estimated, for reasons presented earlier. Variations of 100% from one side of a street to the other (Appendix G, Part 2) do not provide a reliable basis for modifying the estimates in Table 61.

The major conclusion that can be reached from inspection of Table 61 is that in no future year would the calculated CO levels (shown before addition of background) exceed standards (35 ppm for one-hour, 9 ppm for eight-hours) after backgrounds are added. 1980 and 1988 maximum backgrounds (27% factor applied to Alternative A averages) would be 5 ppm (one-hour), and 1 ppm (eight-hour). If urban-canyon effects were such that these average concentrations were doubled, one-hour standards would be violated for all situations, including the Base Years.

5. PHOTOCHEMICAL OXIDANT FORMATION ANALYSIS[15]

The National Ambient Air Quality Standard (NAAQS) for photochemical oxidant has been exceeded at every monitoring station of the Bay Area Air Pollution Control District (see Section V.G., Table 26, page 166), so the impact of YBC redevelopment on oxidant concentrations in the Bay Area is a matter of concern. NAAQ Standard for oxidant states that concentrations shall not exceed 0.08 ppm for one hour anywhere in a control region more than once per year. This section analyzes the effect of the potential YBC development in San Francisco on oxidant concentrations (elsewhere) in the Bay Area. (Oxidant [ozone] is formed primarily by atmospheric reactions involving sunlight, hydrocarbons [HC] and nitrogen oxides [NO_x].[16] Motor vehicle exhaust [which produces approximately three-fifths of all NO_x and one-half of all HC in the Bay Area] is the largest source of those emissions in the YBC area. The chemical reactions which produce oxidant [ozone] usually occur several hours after the HC and NO_x are emitted. By that time the pollutants have been carried miles by the wind and mixed by the atmosphere with pollutants from other sources. The highest oxidant [smog] levels in the Bay Area occur in the areas around Livermore and San Jose. San Francisco emissions contribute in both these areas.)

The purpose of the SAI analysis was to determine whether any YBC alternative would have an impact on oxidant concentrations that is large enough to be determined by available techniques. The Systems Applications, Inc. (SAI) report[12] concluded that none of the four

TABLE 61

LOCALLY GENERATED CARBON MONOXIDE CONCENTRATIONS (ppm) AT SENSITIVE RECEPTORS*

SCENARIO	HARRISON & 4TH 1-HR	HARRISON & 4TH 8-HR	FOLSOM & 3RD 1-HR	FOLSOM & 3RD 8-HR	FOLSOM & 4TH 1-HR	FOLSOM & 4TH 8-HR	HOWARD & 3RD 1-HR	HOWARD & 3RD 8-HR	HOWARD & 4TH 1-HR	HOWARD & 4TH 8-HR	MISSION & 3RD 1-HR	MISSION & 3RD 8-HR	MISSION & 4TH 1-HR	MISSION & 4TH 8-HR
1977	27.	4.0	24.	3.8	23.	3.4	24.	3.8	23.	3.5	23.	4.3	21.	3.9
1980-BASE	19.	2.8	17.	2.6	16.	2.4	17.	2.5	16.	2.3	16.	2.9	15.	2.7
Alt. A	20.	3.1	18.	2.9	17.	2.6	18.	2.9	17.	2.6	17.	3.2	16.	2.9
Alt. B	20.	3.1	18.	2.9	17.	2.6	18.	2.9	17.	2.6	17.	3.2	16.	2.9
Alt. C	19.	2.8	17.	2.7	16.	2.4	17.	2.7	16.	2.4	16.	3.0	15.	2.7
Alt. D	19.	2.8	17.	2.7	16.	2.4	17.	2.7	16.	2.4	16.	3.0	15.	2.7
1988-BASE	18.	2.6	16.	2.7	15.	2.3	17.	2.9	16.	2.4	17.	3.0	16.	2.6
Alt. A	20.	3.2	18.	3.2	17.	2.6	19.	3.6	18.	2.9	18.	3.5	17.	2.9
Alt. B	19.	3.0	18.	3.1	16.	2.5	19.	3.3	18.	2.7	18.	3.4	17.	2.8
Alt. C	18.	2.7	17.	2.8	16.	2.3	17.	3.0	16.	2.5	17.	3.1	16.	2.6
Alt. D	20.	3.2	18.	3.2	17.	2.6	19.	3.6	18.	2.9	18.	3.5	17.	2.9

*Mobile sources only. Sensitive receptors are defined here as areas of proposed subsidized elderly, subsidized family or market-rate housing. Each calculated concentration is at property line at indicated corner. Entries for alternatives include base year traffic contributions. Applicable standards: 1-hour -- 35 ppm; 8-hour--9ppm.

alternatives would produce a detectable change in oxidant concentrations in the other parts of the Bay Area where San Francisco emissions contribute to smog. This was demonstrated by several independent techniques:

The first was by application of the results of a regional study (sensitivity analysis) in the Denver, Colorado area. (The details appear in Appendix G, Part 2.) In that computer study of future smog formation in the Denver metropolitan area, seven variations of population growth were analyzed. In each of the first six, the expected Year-2000 population of one (different) suburban area was reduced by 25%; the "displaced" population was redistributed uniformly throughout the region. In the seventh, the population of Denver itself was reduced by 17.5% and similarly dispersed. Each variation was equivalent to the displacement of 50,000 to 100,000 people from an area of 30 to 75 square miles. (These changes are more-massive perturbations than those proposed for YBC). It was found that no statistically significant effect in ozone concentrations would be produced by any of the seven variations.

The second technique was by comparison of projected YBC emissions with those of the remainder of the Bay Area. SAI found that the ratio of worst-case YBC emissions, as received, to total mixed emissions at the peak-concentration locations (Livermore or San Jose areas) would be less than about 0.2%. Thus, YBC emissions could be expected to have a limited (statistically insignificant) effect on ozone concentration peaks or patterns downwind of the site.

In the third technique, evidence supporting this conclusion is found in a report[17] of a verification study of a photochemical model (LIRAQ-2) for the San Francisco Bay area. This model has a maximum resolution of a 2-km square (that is, it cannot distinguish differences inside any given 2-km [1.2 mile] square) but, for analyzing peak concentrations at distances of the order of 50 km (30 miles) from YBC, the model resolves only 5-km (3 mile) squares. Thus, with the maximum potential resolution (which is deemed realistic in terms of dispersive mixing expected), YBC emissions represent less than 5% of the emissions of a single grid cell. At 60 km (35 miles) downwind, less than 10% of YBC's 5% would remain in the

most directly downwind cell. Most of the YBC emissions would be spread in surrounding cells and most of the material in the downwind cell would have come from cells other than that containing the YBC site. Modeling results[17] confirm these observations.

As a final (fourth) demonstration of the limited sensitivity of Bay Area ozone patterns to YBC emissions, SAI carried out a photochemical modeling exercise, using a trajectory model, in which the model performs the same photochemical reaction analysis as in a grid model but examines additional and resulting concentrations at only those grid locations along the trajectory (wind "path") of the reactive pollutant plume passing through the YBC site. Mobile-source emissions from the YBC area were estimated for existing conditions and each of the four alternatives as a base for the sensitivity analysis. Emissions for the remainder of the region (Bay Area) were described for current conditions and corrected for continuing implementation of emission controls. Forecasts of future emissions, which depend on urban development transit options in other Bay Area locations and on emission control measures, were not expected to (and in the end, did not) play a part in the analysis of the sensitivity of regional oxidant formation to the changes of emissions at YBC.[18]

Analysis of ozone formation was conducted for two trajectories passing through downtown San Francisco in the vicinity of YBC site, one traversing the Bay and proceeding eastward over Oakland and into Livermore, the other moving southeastward over portions of the Bay and into San Jose. Livermore and San Jose ozone (oxidant) concentrations were computed for three cases: (1) YBC Base Year 1988 mobile sources; (2) Same reduced by 1988 Alternative A emissions; and (3) Same reduced by twice the 1988 Alternative A emissions (to check effects of possible errors in emission calculations). Resulting Livermore and San Jose ozone (oxidant) concentrations differed by no more than one part per billion (ppb). One ppb is below the expected accuracy limits of the computation. The data indicate that downwind ozone and nitrogen dioxide concentrations would not be sensitive to the changes in the emissions at the YBC site which may be brought about by the four alternatives.

6. INDOOR/OUTDOOR EFFECTS OF AIR POLLUTANTS IN THE YERBA BUENA CENTER AREA[19]

The indoor and outdoor impacts of air pollutants, especially CO, on the health and comfort of individuals in the YBC area would be affected by the various development alternatives. CO has a cumulative noxious effect in the blood. The one- and eight-hour-average standards (35 and 9 ppm, respectively) are intended to reflect this and are supposed to represent roughly equivalent CO concentrations in the blood. They include margins of safety, in that the dosage levels with the standards are below those at which effects have been documented (Appendix G, Part 2--at the lower levels [15-50 ppm], exposure of more than one hour is required for the effects to occur).

It might seem at first that no individual would be present at the location of a violation of the eight-hour standard for that period of time, so that the full effect of the violation might not be felt. However, as the alternatives include commercial, office and residential indoor space, as well as recreation and travel space outdoors, it is expected that some people would be within the YBC area for 8 hours or more. In particular, housing for the elderly (in all alternatives) and for families (Alternatives B and C and the Redevelopment Agency tentative proposal), and market-rate housing (Alternatives A, B and C and the Redevelopment Agency tentative proposal) would provide a situation where some tenants might be expected to occupy their quarters most or all of each day. (No other sensitive areas [elementary schools, nursery schools, day care centers, hospitals or convalescent hospitals] are under consideration in any of the four alternatives.) Office tenants might be expected to occupy their space for approximately an eight-hour period. Their occupancy would normally overlap at least a portion of the morning and/or evening "rush" hour.

Indoor CO concentrations should average much the same as outdoor concentrations in the immediate vicinity, but indoor variations would lag the outdoor variations. Specific indoor variability would depend on ventilation engineering designs. With a recirculating-type system, indoor CO concentrations might be kept lower than outdoor concentrations.

Indoor sources of CO that have been identified[20] are cigarettes, and fuel-burning appliances such as gas cooking stoves and furnaces. If no indoor sources of CO existed, motor vehicle emission sources would dominate the YBC indoor concentrations. Daytime indoor concentrations (assuming worst case conditions: poor ventilation systems, low inversion height, high outdoor pollutant emissions) would be expected to exceed nighttime levels, largely due to higher daytime traffic emissions. With nighttime inversions, the reverse could occur in the evening, particularly in winter, when much of the homeward-bound traffic occurs after dark.

Probably the least indoor exposure to outdoor pollutants would be experienced by shoppers in commercial space and by individuals attending convention center events, particularly if the events did not span commuting hours. Outdoor exposures could range from a few minutes for the passenger of a vehicle passing through the YBC area to hours for people relaxing in an open park (proposed in Alternatives A, B, and C and the Redevelopment Agency November 1977 tentative proposal).

The health of existing and future residents could be affected by particulate production associated with construction activity. High particulate levels could irritate the respiratory tracts of healthy people. The combination of high particulates and sulfur oxides within a few city blocks of construction locations could cause problems of breathing for elderly individuals and those in poor health (Appendix G, Part 2).

The outdoor/indoor levels of air pollutants in general are of particular concern to the Department of Housing and Urban Development. HUD criteria are based on pollutant level thresholds in relation to housing location and design.[21] The criteria used by HUD to evaluate the acceptability of an area for housing are shown in Table 62. Generally, if the maximum expected pollutant concentration is expected to exceed the Table 62 threshold criterion of 140% of the standard (for the applicable pollutant and averaging time), residential use is not recommended.

Combined maximum mobile and stationary source concentration estimates (with 27% background factor added for CO, SO_x and NO_x, 35

ug/m^3 added for SP) for the YBC area in Table 59 can now be compared to the HUD pollutant thresholds of Table 62. This would apply to those pollutants which as emitted directly affect health. These include CO, SO_x, SP, and NO_x. Calculated levels of HC are not of concern in this regard, as HC are primarily precursors of smog, which usually forms

TABLE 62

HUD Threshold Criteria*

1. If the concentration of pollutant exceeds 140% of standard, the site is not recommended for residential use.

2. If the concentration ranges from 1.0 to 1.4 times the standard, designation of outdoor space at the site for recreation or rest, especially for children or the elderly, is not recommended. Building construction requires special techniques.

3. If the concentration ranges from 0.7 to 1.0 times the standard, some precautions must be taken in design, construction and use of the property.

4. If concentrations are lower than 0.7 times the standard, traditional construction methods and unrestricted uses of the property are possible.

*From EPA (1974),[21] op. cit.

and concentrates miles downwind of the emission point. The comparisons lead to the following conclusions:

1) CO

a) 1-hour standard--For all alternatives in 1980 and 1988, less than 140% of standard. Worst-case (Alternative A-1988) is 72% of standard (Criterion 3 applies); Base Year 1988 is at 69% of standard, Base Year 1980 at 68%.

b) 8-hour standard--Some 1988 alternatives over 140% of standard:

A and D - 1988: 159% (Criterion 1 applies)
B - 1988: 137% (Criterion 2 applies)
Redevelopment
Agency tentative
proposal: >140% (Criterion 1 applies)
C - 1988: 116% (Criterion 2 applies)
Base Year 1988: 132% (San Francisco monitoring station projection)

Maximum 1980 alternatives (A and B and Redevelopment Agency tentative proposal) at 126% of standard--C and D - 1980 at 107%--Base Year 1980 at 131%

2) <u>SO_x (24-hour standard)</u>

a) <u>1988</u>--All but Alternative C over 140% of standard. Base Year 1988 over 140% of standard.

A and D - 1988: 660% (Criterion 1 applies)
B - 1988: 254% (Criterion 1 applies)
Redevelopment
Agency tentative
proposal: >140% (Criterion 1 applies)
C - 1988: 114% (Criterion 2 applies)
Base Year 1988: 164%

b) <u>1980</u>--Alternatives A and B over 140% of standard. Base Year 1980 over 140% of standard:

A and B and Redevelopment Agency tentative
proposal - 1980: 152% (Criterion 1 applies)
C and D - 1980: 51%
Base Year 1980: 260%

3) NO_x (1-hour standard)--With the NO_2/NO_x ratio taken into account (see page 377), there should be no violations due to YBC in 1980 and 1988.

4) SP (24-hour standard)

a) 1988--No alternatives over 140 % of standard. Base Year 1988 over 140% of standard.

A and D -. 1988:	115%	(Criterion 2 applies)
B - 1988:	83%	(Criterion 3 applies)
Redevelopment Agency tentative proposal:	83-100%	(Criterion 3 applies)
C - 1988:	63%	
Base Year 1988:	163%	

b) 1980--No alternative over 140% of standard. Base Year 1980 over 140% of standard.

A and B and Redevelopment Agency tentative proposal - 1980:	89%	(Criterion 2 applies)
C and D - 1980:	75%	(Criterion 2 applies)
Base Year 1980:	148%	

If the criteria of Table 62 were applied, proposed housing in Alternatives A, B and D and the Redevelopment Agency tentative proposal would not be recommended (Criterion 1, sulfur oxides); potential mitigation measures would be irrelevant. Excessive 24-hour SO_x concentrations in YBC would be caused primarily by burning of fuel oil in the proposed larger YBC structures. In any event, downtown San Francisco SO_x levels would exceed 140% of the standard (Base Years 1988 and 1980); under the criteria, HUD would not recommend construction of housing anywhere in San Francisco where SO_x levels equalled or exceeded those at the BAAPCD monitoring station. The CO violations (levels over 140% of standard) would in themselves rule out HUD support for proposed housing in Alternatives A

and D and the Redevelopment Agency tentative proposal under the HUD criteria.

Appendix G, Part 2 identifies some of the major health effects of air pollutants and the thresholds which may cause health impairment.

FOOTNOTES

[1]Cermak, J. E., et al., 1972, Wind and Air-Pollution Control Study of Yerba Buena Center, Colorado State University Department of Civil Engineering.

[2]Except where extra underground levels are proposed, as for the convention center, and possibly for office buildings. The 1973 YBC EIR stated that the deepest excavation would be that for the then-proposed underground parking garage (-35 feet) in the sports arena/exhibit hall block.

[3]Compilation of Air Pollutant Emission Factors, Second Edition, February 1976 and Investigations of Fugitive Dust Sources, Emissions and Control, May 1973.

[4]While effects on air quality, and achievability of air quality maintenance plans, are functions of total pollutant concentrations from all sources, it is useful to show the separate contributions of mobile vs. stationary sources before presenting the totals.

[5]BAAPCD, Guidelines for Air Quality Impact Analysis of Projects, 1975.

[6]A description of the BAAPCD guideline approach including computation forms is available in the files of the Office of Environmental Review, Planning Department, City of San Francisco.

[7]EPA, 1974, Guidelines for Air Quality Maintenance Planning and Analysis; Volume 13. Note: Computation forms used in the stationary source analysis are on file with the Office of Environmental Review, Planning Department, City of San Francisco.

[8]EPA, 1976, Compilation of Air Pollutant Emission Factors, 2nd Ed.

[9]This will be referred to as the 27% background factor.

[10]Source: BAAPCD Base Year Emissions for 1977, 1980 and 1988 (modeled results obtained from N. Flynn, Air Pollution Engineer, BAAPCD, August 15, 1977).

[11]Source: Data from N. Flynn, as above.

[12]Results of one form of carbon monoxide dispersion modeling are summarized here; a copy of the entire Systems Applications, Inc. (SAI)

report Analysis of the Impact on Ambient Oxidant and Carbon Monoxide of Emissions from the Proposed Yerba Buena Center, September, 1977, is on file with the Office of Environmental Review, Planning Department, City of San Francisco. Note that the results of the SAI report have been corrected in this EIR (for example in Table 60) to reflect current EPA and ARB emission-control estimates for 1980 and 1988, and to reflect a reanalysis of the traffic volumes in YBC.

[13]This aspect of the CO analysis was not a part of the SAI effort.

[14]See Appendix G, Table G-3. For the contribution from streets at right angles to the freeway, the wind angle would be 67.5^{o}. The guideline contribution would then be reduced by the factor (sin 22.5^{o})/(sin 67.5^{o})

[15]Results of photochemical oxidant formation analysis and modeling performed by Systems Applications, Inc. (SAI) are summarized here. A copy of the entire report is on file with the Office of Environmental Review, City of San Francisco. The SAI results have been found to be unaffected by subsequent changes in input data (see footnote 12).

[16]See Appendix G, Part 2, for technical discussion of oxidant formation.

[17]Duewer, W. H., et al., 1975, Photodissociation Rate Calculation, Appendix 9-4 of Development of An Air Pollution Model for the San Francisco Bay Area, M. C. MacCracken and G. D. Sauter, eds., UCRL-51920, Lawrence Livermore Laboratory, University of California, Livermore, California.

[18]See Appendix G, Part 2, for assumptions and data used in the analysis.

[19]This analysis is based on the SAI report (op. cit.).

[20]Yocom, J. E., W. L. Clink, and W. A. Cote, 1970, Indoor/Outdoor Air Quality Relationships, 63rd Annual Meeting of the Air Pollution Control Association, 14-19 June, 1970, St. Louis, Missouri.

[21]Concepts and one (earlier) set of criteria appear in Environmental Protection Agency, 1974, Air Pollution Considerations in Residential Planning, Volume I, Manual.

H. NOISE

1. HAUL ROUTES

There might be as many as 80 haul trucks (160 trip ends) an hour (from 9 AM to 4 PM--see Section VII.F) in and out of YBC during the estimated five months of excavation for the convention center. This would be the maximum period of construction traffic and would therefore also be the period of maximum construction truck traffic noise impact. The exact locations of the excavation disposal sites are not yet known (see Section VI.E.4, page 300); the noise impacts associated with construction truck traffic will therefore be discussed in general terms.

Because the streets into and out of YBC that may be used as haul routes are one-way streets (Third, Fourth, Folsom, and Howard), there might be a maximum construction truck traffic volume of 80 trucks an hour on a given street. Along these streets the daytime L_{10}[1] would be about 78-81 dBA at a distance of 25 feet from the centerline of the near traffic lane. This is the distance of a typical building setback in the area. In the open, at a distance of 50 feet from the centerline of the near traffic lane, the expected L_{10} is 76-78 dBA. The existing daytime L_{10} in this area varies from about 65 to 71 dBA along Howard St. and from 61 to 67 dBA along Third, Fourth, and Folsom Sts. at a distance of 50 feet from the centerline of the near lane. The anticipated noise increase during the hauling of excavation material would be about 5-13 dBA along Howard St., and about 9-17 dBA along Third, Fourth or Folsom Sts. A 10-dBA increase represents about a doubling in (perceived) loudness.

The noise impact of construction truck traffic outside YBC would depend on the location of the disposal sites and the associated routes, the land uses along the routes, and the existing L_{10}s along the routes. If only one disposal site were in use at a time, the noise levels associated with the construction truck traffic would be about the same as in YBC itself, regardless of location, except that on two-way streets noise levels would be about 3 dBA greater due to the doubling in truck traffic volume.

During excavation and construction in the remainder of YBC, there could be as many as 120 haul truck movements per hour (Section VI.F., page 346). Induced noise level changes would be lower (by about 1 dBA) than those cited above.

2. CONSTRUCTION NOISE

Construction activities would temporarily increase noise levels near the noise generating sources. The noise levels caused by construction activities would fluctuate measurably, depending on the following variables:

- the phase of construction;
- the duration;
- the type(s) of equipment used during each phase;
- the noise emission of a particular item of equipment during its "noisy" operation;
- the proportion of a day during which the equipment would be operating in its "noisy" mode, described as the "usage factor;"
- the mobility of the equipment, e.g., the noise source might be a stationary air compressor or a self-propelled back-hoe; the mobility of the source is interdependent with the usage factor in determining the impact upon a fixed receptor (such as a residence);
- the distance between the noise source and the receptor;
- the noise-propagation characteristics of the path between the noise source and receptor (e.g., shielding by a barrier would result in a reduced noise level at the receptor).

During construction, adherence to the provisions of the San Francisco Noise Ordinance would result in less than about 3 dBA increase (a 3 dBA increase is barely perceptible) at existing housing in the area, when the construction is located across the street from housing. This is because the noise emission levels of the construction equipment would be at about the same noise levels as those produced by daytime traffic in the area. When construction is taking place in lots immediately adjacent to housing, greater impact can be expected. Impulsive (pulse-type) noise due to riveting, pounding, banging, etc., would result in a 10-20 dBA instantaneous change in noise levels in the closest housing units, producing a startle reaction. While people would probably become used to this, it would be annoying nonetheless.

Noise levels inside office buildings in the area would be increased less than 3 dBA during most construction. During those times when construction is taking place within 100 feet of an office building, noise levels may reach peaks of 55 dBA inside, depending upon the operation. If the noise level inside these buildings is currently about 40-45 dBA, typical of office buildings in downtown areas, a 10-15 dBA increase in noise level would occur. While this is a doubling to tripling of perceived noise, the resulting noise level would not interfere with speech communication and normal office usage. This noise level would be distracting; the overall impact of construction noise on workers inside office buildings in the area would be limited to the duration of construction taking place this close to existing office buildings.

3. LONG-TERM NOISE IMPACTS AND LAND USE COMPATIBILITY

The noise impact in YBC due to (after) the full development of any of the alternatives is expected to be barely perceptible, for the following reasons: The increases in traffic associated with the highest-density alternatives (A and D) would increase the CNEL by less than 2 dBA over the noise level that would exist in 1980 without the YBC development, and by less than 3 dBA over the noise level that would exist in 1988 without

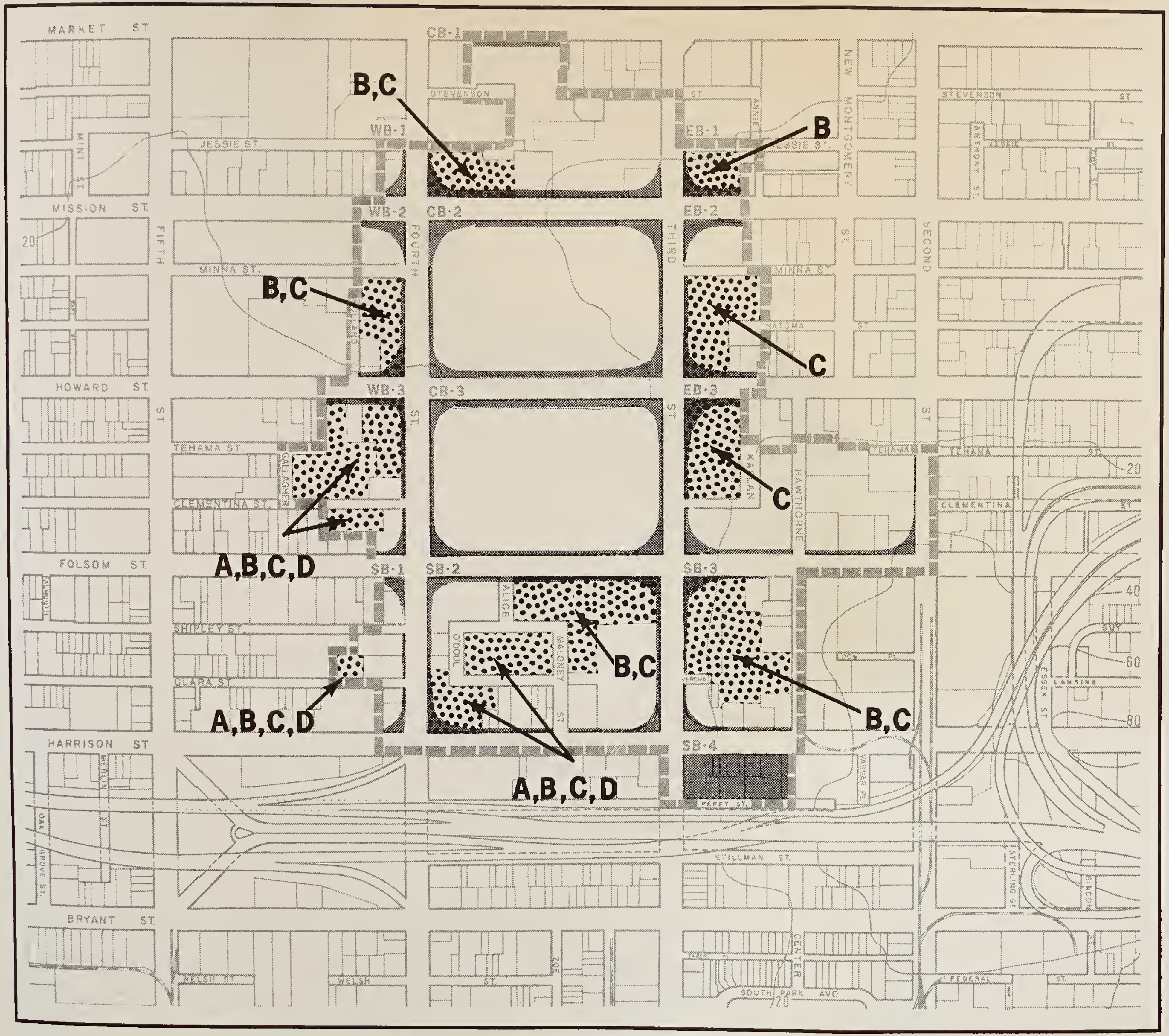
the YBC development. An increase of 3 dBA is about the threshold of perceived change. Thus the average noise environment in YBC in future years would be essentially the same with or without the development. However, noise levels in the YBC area are already high enough so that some uses, particularly housing, would be incompatible without mitigation.

To show where in YBC current noise levels in the open exceed the HUD criteria (Appendix H) for exterior noise for housing (24-hour L_{33} greater than 65 dBA), Figure 40 has been prepared. This map shows in gray the area where the existing 24-hour L_{33} equals or exceeds 65 dBA. On the map the lines delineating the blocks are the property lines; the curb lines are 10 feet (the nominal width of a sidewalk in this area) out into the street (except for Market St., where the sidewalk width is 35 feet). Because of the small scale of this map, the actual locations of the contours are difficult to see; for this reason, Table 63 has been included. The table shows the distance to the 24-hour L_{33} = 65 dBA contour from the curb line along the major streets in YBC. Day-to-day variations in the noise level could cause the contour to shift about 10 feet in either direction. The Redevelopment Agency tentative proposal would exceed the HUD criteria for housing in the same areas as indicated for Alternative B.

TABLE 63

DISTANCE FROM CURB LINE TO 24-HOUR L_{33} = 65 dBA CONTOUR

Street	Distance in Feet
Market Street	40
Mission Street	40
Howard Street	40
Folsom Street	20
Harrison Street	20
Second Street	10
Third Street	20
Fourth Street	20



LEGEND

Area where 24 hour L_{33} is greater than 65 dBA

Housing

A Alternative A

B Alternative B

C Alternative C

D Alternative D

0 0.5 Kilometer

0 1800 Feet

NOISE COMPATIBILITY (HUD)	40

Figures 41 through 44 (pages 401 to 407) show, for each alternative, the proposed land uses (on a lot-by-lot basis) that would not meet the goals[2] of the Transportation Noise Section (August 1974) of the Environmental Protection Element of the Comprehensive Plan of the City of San Francisco[3] without mitigation based on a detailed acoustical analysis of the proposed use at the particular location. The dwelling units proposed in the Redevelopment Agency tentative proposal would be in the same locations as those in Alternative B and would not meet the goals of the Environmental Protection Element in the same areas shown for Alternative B on Figure 42 (page 403). If the recreation/entertainment park were built as part of the tentative proposal, the areas of the park exceeding "satisfactory" noise levels would be the same as those shown on Figure 42; the hotel and commercial spaces on CB-1 (moved from CB-2 to accommodate the recreation/entertainment park) would be impacted in the same way as would the office space shown for that area in Figure 42. Noise levels would meet the Environmental Protection Element goals at the southeast corner of Third and Howard if a parking garage were to replace office space in the tentative proposal. If the central blocks were developed in the tentative proposal as proposed in Alternative A, the areas exceeding "satisfactory" noise levels would be similar to those shown on Figure 41 for Alternative A. The remaining land uses in the tentative proposal would be similar to those proposed in Alternative A with similar noise levels.

Alternative A has the smallest amount of land area that would not meet the goals of the Transportation Noise Section of the Comprehensive Plan of San Francisco. With Alternative A as a base, Alternative D would have slightly more area not meeting the goals (less than 5% more), Alternative B and the Redevelopment Agency tentative proposal would have about 40% more and Alternative C would have about 70% more. These changes reflect primarily the addition of housing from "A" to "B" (and the Redevelopment Agency tentative proposal) to "C".

Noise levels in the public park (Alternative C--CB-2) in 1988 would range from an L_{eq} (daytime) of about 59 dBA in the center of the block to an L_{eq} of about 69 dBA at the edge of the park along Mission St. and along Howard St. Noise level along Third and Fourth Sts. at the edges of

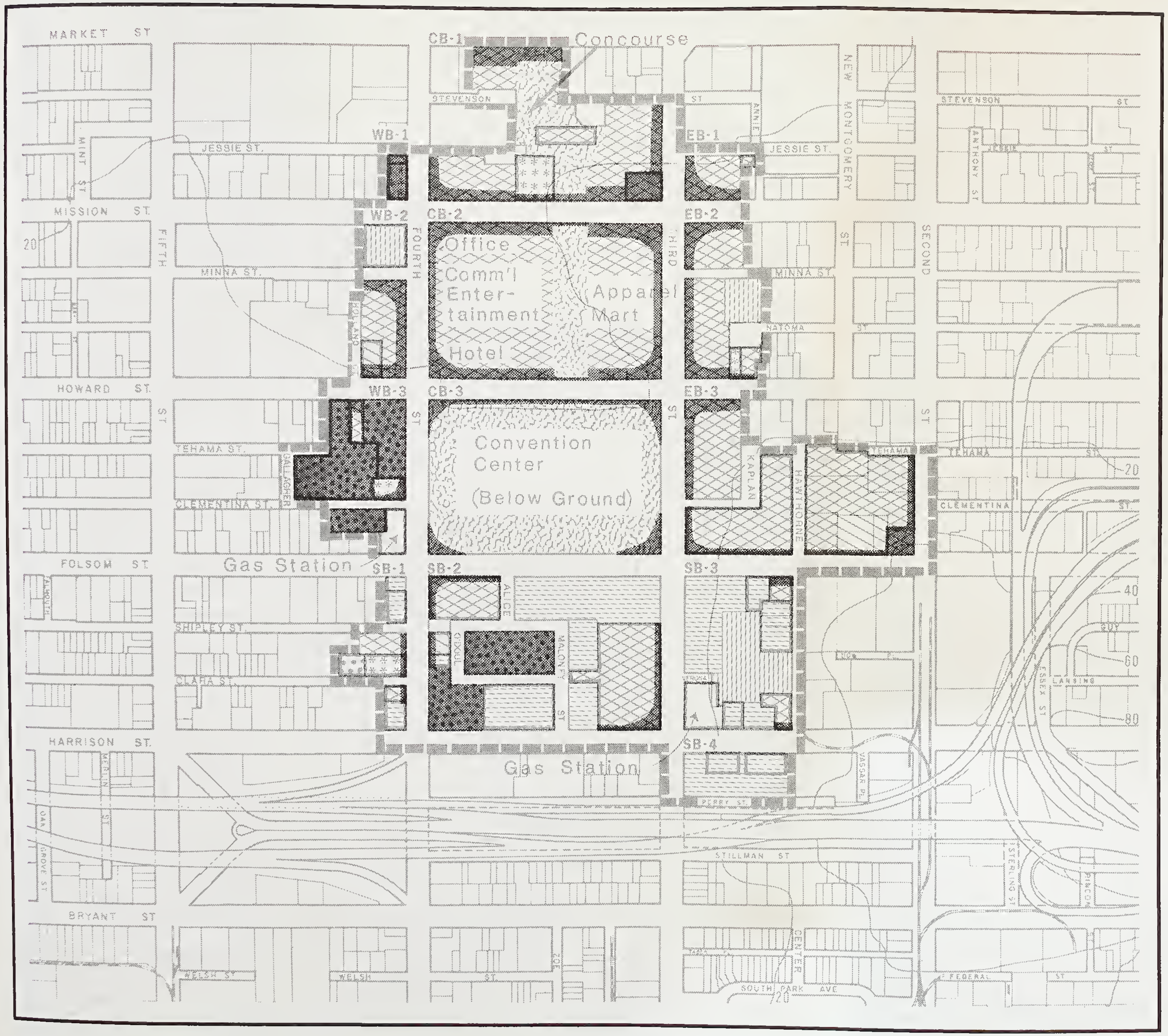
the park would be an L_{eq} of about 66 dBA. At the four corners, the L_{eq} would be about 70 dBA. L_{dn}, the basis for the City's criteria, is generally about 3-4 dBA higher than daytime L_{eq}.

FOOTNOTES

[1]See Section V.H for definitions.

[2]Appendix H, Figure H-1, page 145.

[3]City Planning Commission Resolution 7244, September 19, 1974.



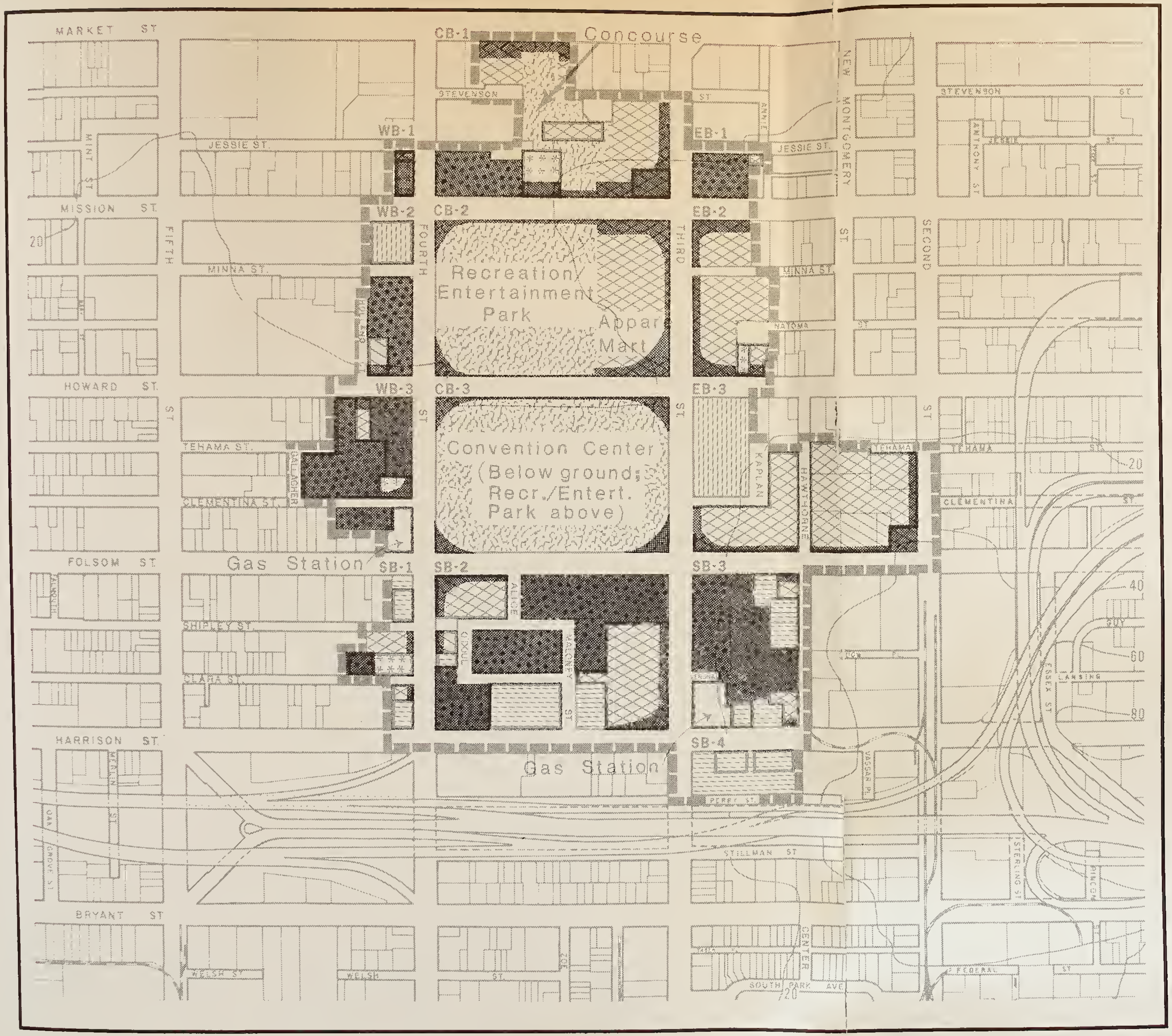
LEGEND

- Housing-60 dBA
- Office & Retail-65
- Downtown Support-65
- Light Industry-75
- Parking
- Community Service-68
- Park-70
- Areas where noise exceeds the "satisfactory" levels stated in the "Transportation Noise Section of the Environmental Protection Element of the Comprehensive Plan, City of San Francisco." Basis for criteria: L_{dn} (roughly equivalent to CNEL) -- that is, for example, "Housing" criterion is L_{dn} of 60 dBA in open.

0 — 0.5 Kilometer

0 — 1800 Feet

NOISE COMPATIBILITY (CITY OF SAN FRANCISCO) ALTERNATIVE A	41



LEGEND

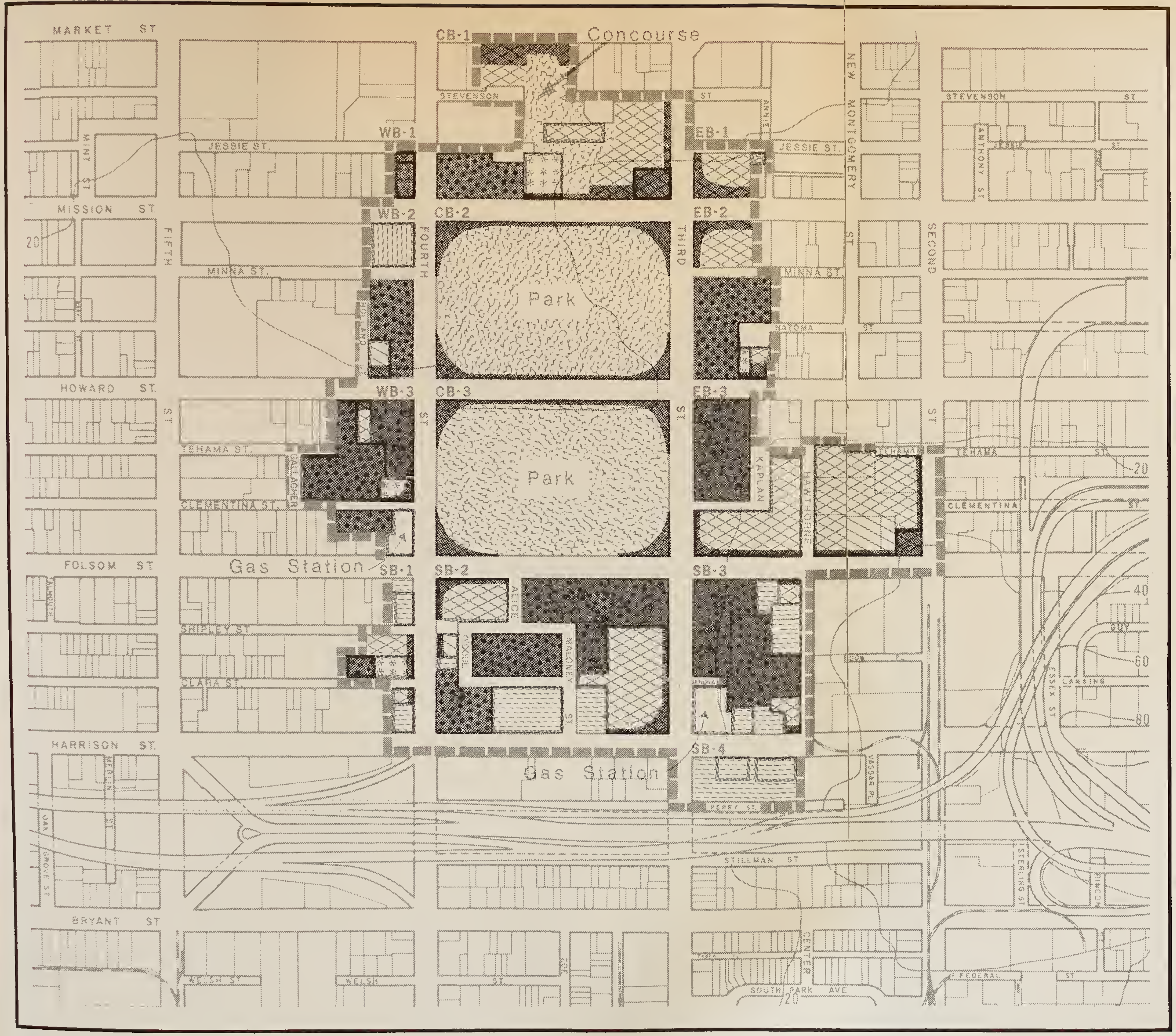
(dotted)	Housing-60 dBA
(cross-hatched)	Office & Retail-65
(diagonal lines)	Downtown Support-65
(horizontal lines)	Light Industry-75
(vertical lines)	Parking
(asterisks)	Community Service-68
(wavy pattern)	Park-70
(shaded)	Areas where noise exceeds the "satisfactory" levels stated in the "Transportation Noise Section of the Environmental Protection Element of the Comprehensive Plan, City of San Francisco." Basis for criteria: L_{dn} (roughly equivalent to CNEL) -- that is, for example, "Housing" criterion is L_{dn} of 60 dBA in open.

N

0 — 0.5 Kilometer

0 — 1800 Feet

NOISE COMPATIBILITY (CITY OF SAN FRANCISCO) ALTERNATIVE B	42



LEGEND

Housing-60 dBA

Office & Retail-65

Downtown Support -65

Light Industry -75

Parking

Community Service -68

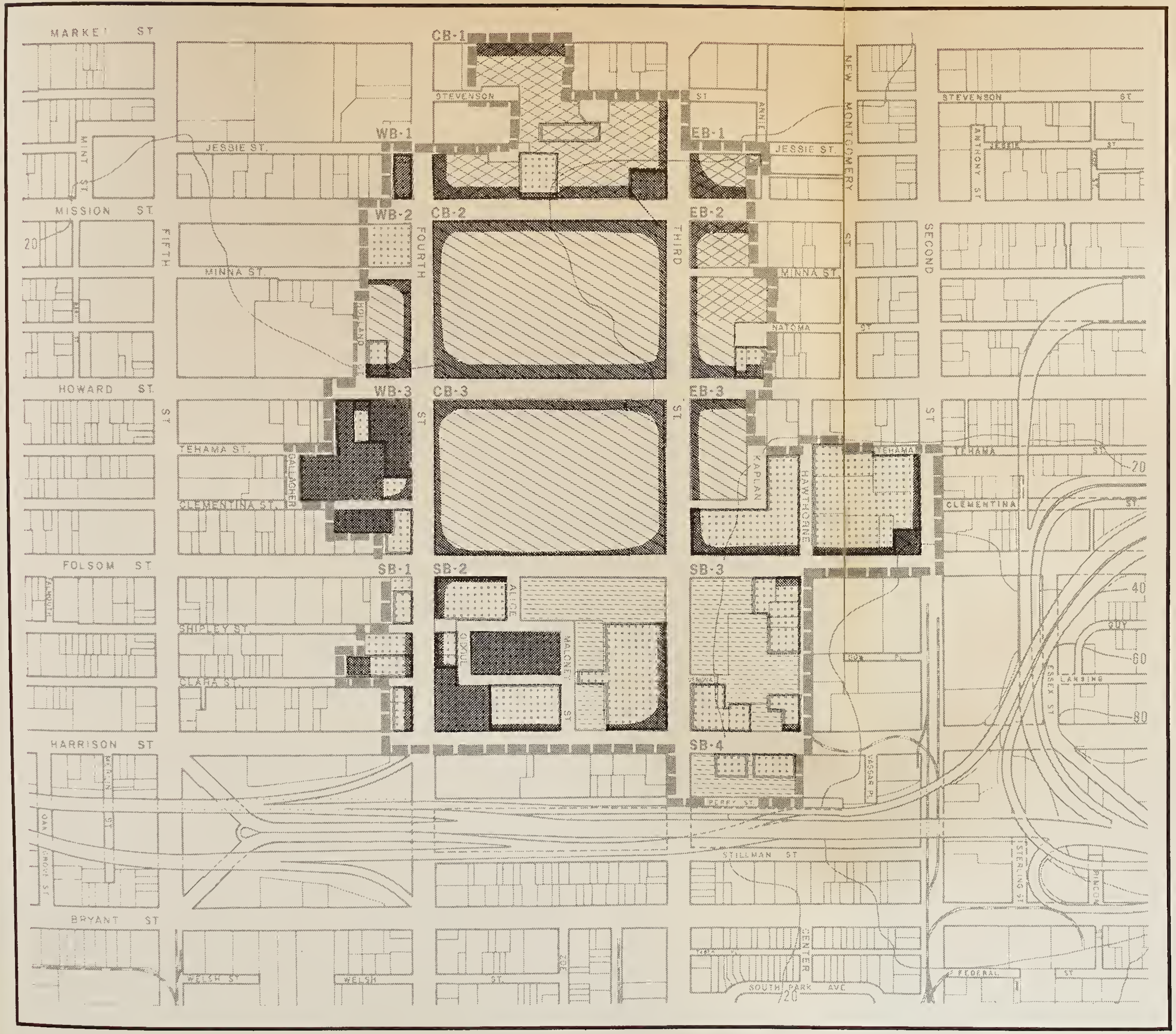
Park -70

Areas where noise exceeds the "satisfactory" levels stated in the "Transportation Noise Section of the Environmental Protection Element of the Comprehensive Plan, City of San Francisco." Basis for criteria: L_{dn} (roughly equivalent to CNEL) -- that is, for example, "Housing" criterion is L_{dn} of 60 dBA in open.

0 0.5 Kilometer

0 1800 Feet

NOISE COMPATIBILITY (CITY OF SAN FRANCISCO) ALTERNATIVE C	43



LEGEND

Office & Retail-65 dBA

Downtown Support-65

Light Industry-75

Existing, under construction, or committed*

Areas where noise exceeds the "satisfactory" levels stated in the "Transportation Noise Section of the Environmental Protection Element of the Comprehensive Plan, City of San Francisco." Basis for criteria: L_{dn} (roughly equivalent to CNEL) -- that is, for example, "Office and Retail" criterion is L_{dn} of 65 dBA.

*See Figure 41, 42, or 43 for actual use.

0 — 0.5 Kilometer

0 — 1800 Feet

NOISE COMPATIBILITY (CITY OF SAN FRANCISCO) ALTERNATIVE D	44

I. RESOURCE USE

1. ENERGY

Operations after Development

The estimated energy use for each alternative (at full development) is shown in Table 64. The table shows both the energy used directly by each alternative, and the equivalent energy use at the source of the energy (this adjusts for energy losses in generation, transmission, and distribution of each form of energy). These estimates were based upon the number of sq.ft. of each type of use (residential, commercial, office, industrial and convention center) planned for each alternative. All structures were assumed to be constructed or renovated to meet applicable State Energy Commission Standards. The table indicates that Alternative C would require the lowest commitment for continuing demands on fossil fuels. The other alternatives in order of increasing commitment are Alternative B, Alternative A, and Alternative D. The Redevelopment Agency November 1977 tentative proposal energy uses and demands would be intermediate between those of Alternatives A and B if the central blocks contained hotel and office uses and a public park on top of the convention center. If the recreation/entertainment park replaced the surface uses in the central blocks, the energy uses and demands would be approximately the same as those in Alternative B.

The annual and daily variations in demand for electricity and natural gas for each alternative are shown in Figures 45 through 48. These figures show the energy used directly by the alternative. Of primary interest in these figures is peak demand data, because it is during peak demand periods that the capacity of an energy system is likely to be exceeded. For electricity, the peak demand month is September due to increased electric demand from air-conditioners (Figure 45, page 413); therefore, the daily demand graph shows a typical day in September. Peak demand occurs at 5 p.m. on such days (Figure 46, page 415). Alternative C shows the lowest peak demand of the alternatives, indicating that it would have the smallest effect upon the

peak capacity of the electrical supply system. The other alternatives in order of increasing peak demands are Alternative B, Alternative A, and Alternative D.

For natural gas, the peak demand month is January due to increased demand from space heaters (Figure 47, page 417); therefore, the daily demand graph shows a typical day in January. Peak demand occurs at 7 p.m. on such days, as buildings start to cool and the evening meal is prepared (Figure 48, page 419). A secondary peak occurs in the early morning hours as energy storáge systems which have been allowed to cool during the night are again heated. Alternative A shows the lowest peak demand of the alternatives, indicating that it would have the smallest effect upon the peak capacity of the natural gas supply system. The other alternatives in order of increasing demands are Alternative D, Alternative B, and Alternative C.

The electric energy uses (both total and peak) are dominated in all alternatives by the demands of office-type structures. Electric energy is used for ventilation and cooling in office structures, operation of elevators, lighting, and operation of office machines. The energy use for cooling is associated primarily with the need to eliminate waste heat (from lights and from the body heat of the office workers), rather than with weather conditions. Nevertheless, seasonal variations in temperature are reflected in monthly variations in electrical demand. Similar considerations apply to retail commercial uses. The equivalent energy use (at source) for electrical energy is three times (i.e., 200% higher) the energy used directly on the site because of losses in generation, transmission and distribution. This leads to an energy conservation principle, which is to avoid the use of electric energy for any purpose for which another, more efficient source is possible.

The natural gas energy use estimates are based upon the assumption that current regulations will continue. These regulations do not permit new natural gas hookups when the anticipated peak-month demand will exceed 50,000 cubic feet per day for an average operating day in that month. This implies a maximum size of building which can be

TABLE 64

ESTIMATED FUTURE ENERGY USE; YBC FULL DEVELOPMENT

Alternative	Electric	Natural Gas	Fuel Oil	Vehicle Energy	Total
A	*140 x 10^6 KWH **x10,200 BTU/KWH	117 x 10^6 cu ft x1,100 BTU/cu ft	1.49 x 10^6 gal x 153,000 BTU/gal	11.8 x 10^6 gal x 229,000 BTU/gal	
	***1.44 x 10^{12} BTU	0.13 x 10^{12} BTU	0.23 x 10^{12} BTU	2.70 x 10^{12} BTU	4.5 x 10^{12} BTU
B	*88 x 10^6 KWH **x10,200 BTU/KWH	127 x 10^6 cu ft x1,100 BTU/cu ft	0.57 x 10^6 gal x153,000 BTU/gal	8.2 x 10^6 gal x 229,000 BTU/gal	
	***0.82 x 10^{12} BTU	0.14 x 10^{12} BTU	0.09 x 10^{12} BTU	1.88 x 10^{12} BTU	2.9 x 10^{12} BTU
C	*50 x 10^6 KWH **x10,200 BTU/KWH	169 x 10^6 cu ft x1,100 BTU/cu ft	0.09 x 10^6 gal x153,000 BTU/gal	4.7 x 10^6 gal x229,000 BTU/gal	
	***0.52 x 10^{12} BTU	0.18 x 10^{12} BTU	0.01 x 10^{12} BTU	1.08 x 10^{12} BTU	1.8 x 10^{12} BTU
D	*152 x 10^6 KWH **x10,200 BTU/KWH	146 x 10^6 cu ft x1,100 BTU/cu ft	1.38 x 10^6 gal x153,000 BTU/gal	11.8 x 10^6 gal x229,000 BTU/gal	
	***1.56 x 10^{12} BTU	0.16 x 10^{12} BTU	0.21 x 10^{12} BTU	2.70 x 10^{12} BTU	4.6 x 10^{12} BTU

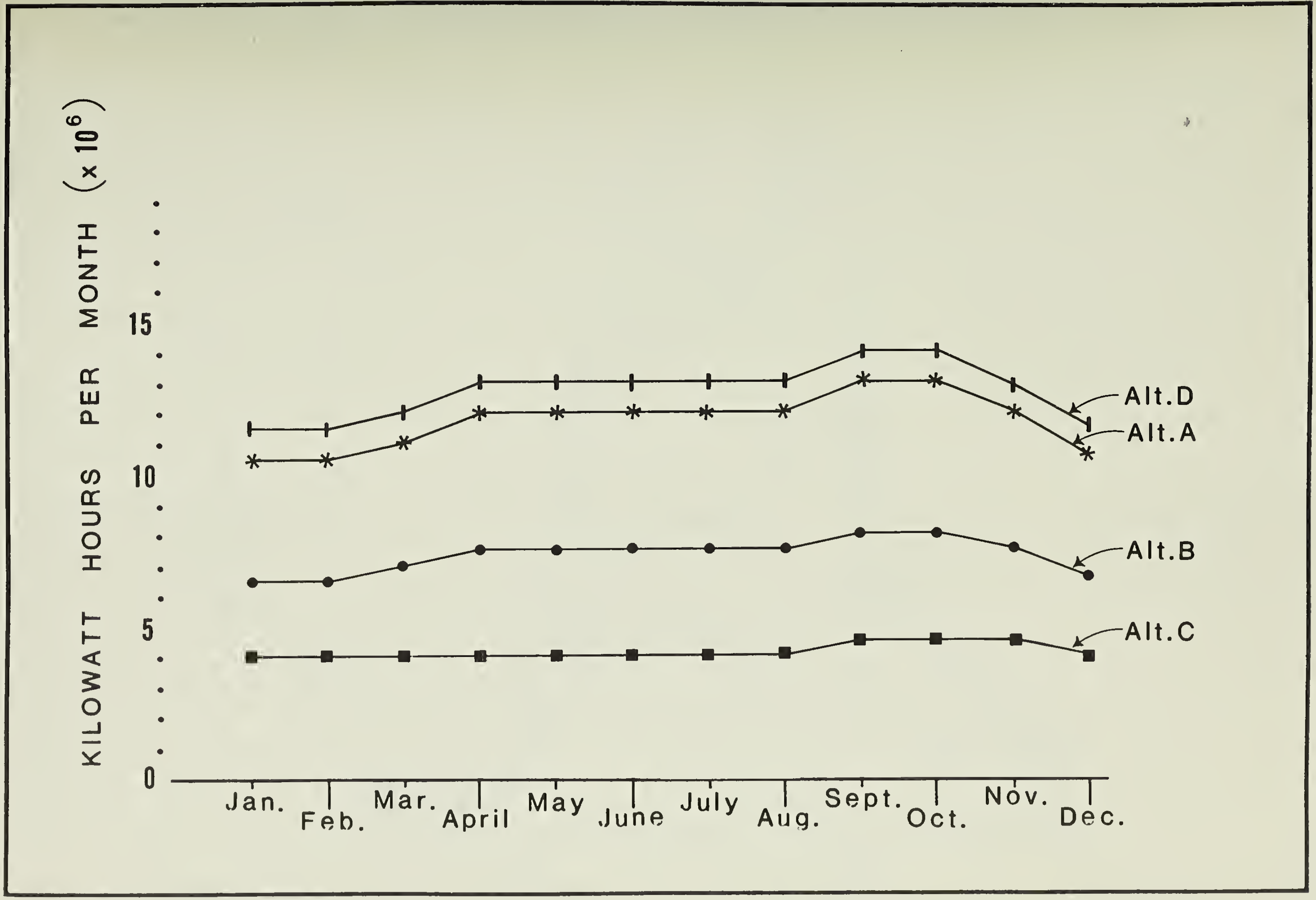
*Direct energy use.
**Conversion factor which adjusts for energy losses in generation, transmission, distribution, maintenance, etc. as specified by the State Energy Commission and CALTRANS. (See Footnote 1).
*** Equivalent energy use--at source.

heated with natural gas; structures larger than this maximum are assumed to use fuel oil for heating. This means that to some extent, the natural gas demands of each alternative reflect the anticipated sizes of the structures.

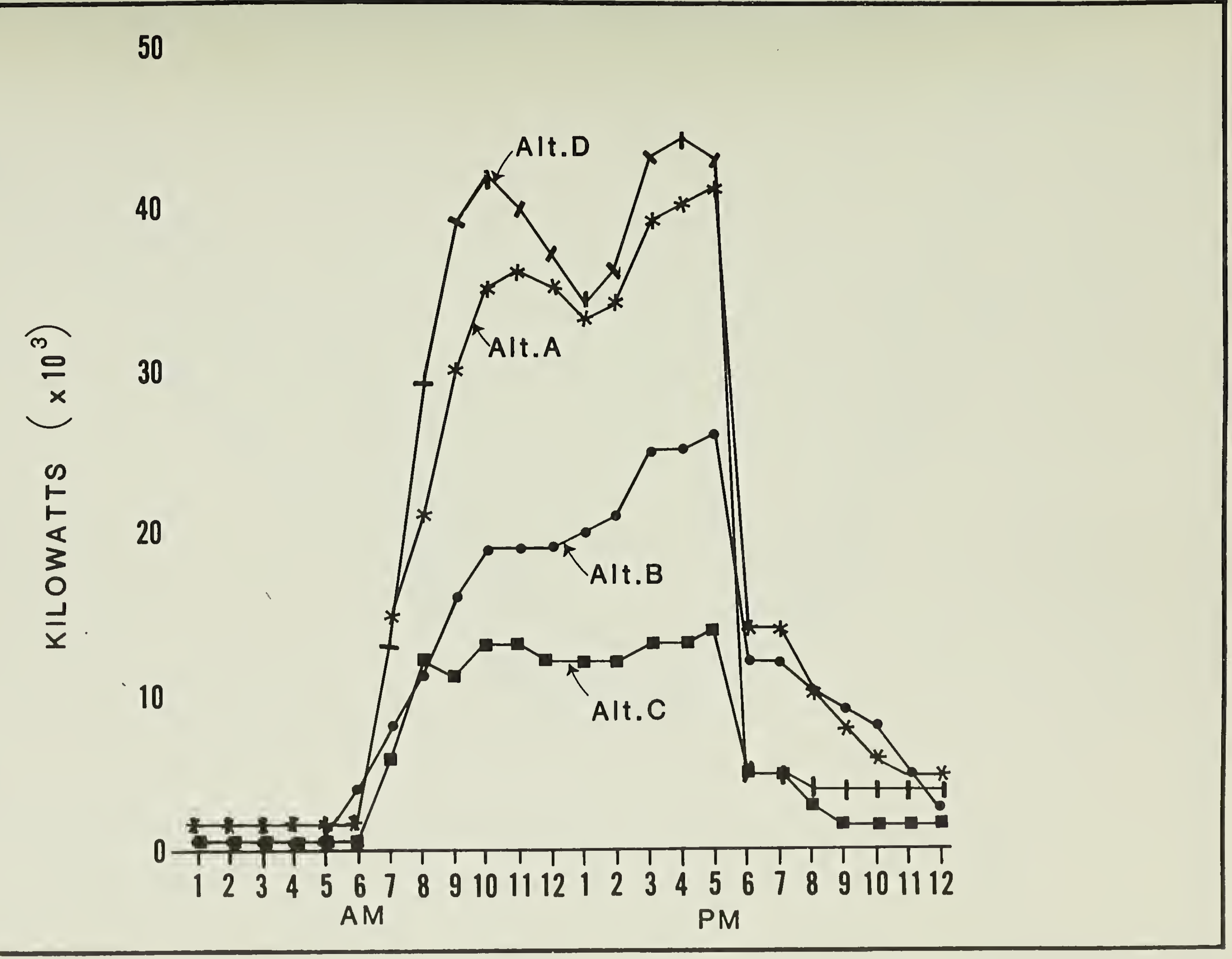
In all alternatives except Alternative D the residential structures dominate both the total consumption and the peak natural gas demands. Residential uses of natural gas include cooking, water heating and space heating. The demands for these uses frequently coincide during the evening hours. In Alternative D, there is so much office space (for energy calculations, downtown support space is treated as office space) and so little residential space that office space dominates the total natural gas demand; however, residential structures continue to dominate the peak during the evening peak demand time. The equivalent energy use (at source) for natural gas is 11% higher than the natural gas energy used directly on-site. This reflects the energy cost of securing and transporting natural gas; it should be compared with the overall electrical production and transmission energy which is 200% higher than the direct use.

The fuel oil energy use is again based upon the assumption that present restrictions for new natural gas hookups will continue, thus requiring oil burners in larger buildings. In all alternatives, office uses dominate the demand for fuel oil. This fuel would be used to provide space heating and hot water. The equivalent energy use (at source) for fuel oil is 16% higher than the fuel oil energy used directly on-site; this reflects the energy cost of securing, transporting and refining fuel oil. This should be compared with the 200% "surcharge" for electrical power.

The use of vehicle fuel energy for each alternative is a direct function of the total (regional) vehicle miles travelled, for all trips generated by the alternatives. The overall energy use for vehicle fuel is 74% higher than the fuel energy used directly (for the year 1988). This reflects the energy costs of acquiring, transporting and refining the fuel plus the other energy costs associated with operating and maintaining a vehicle (tires, oil, etc). Vehicle energy use can be expected to decline

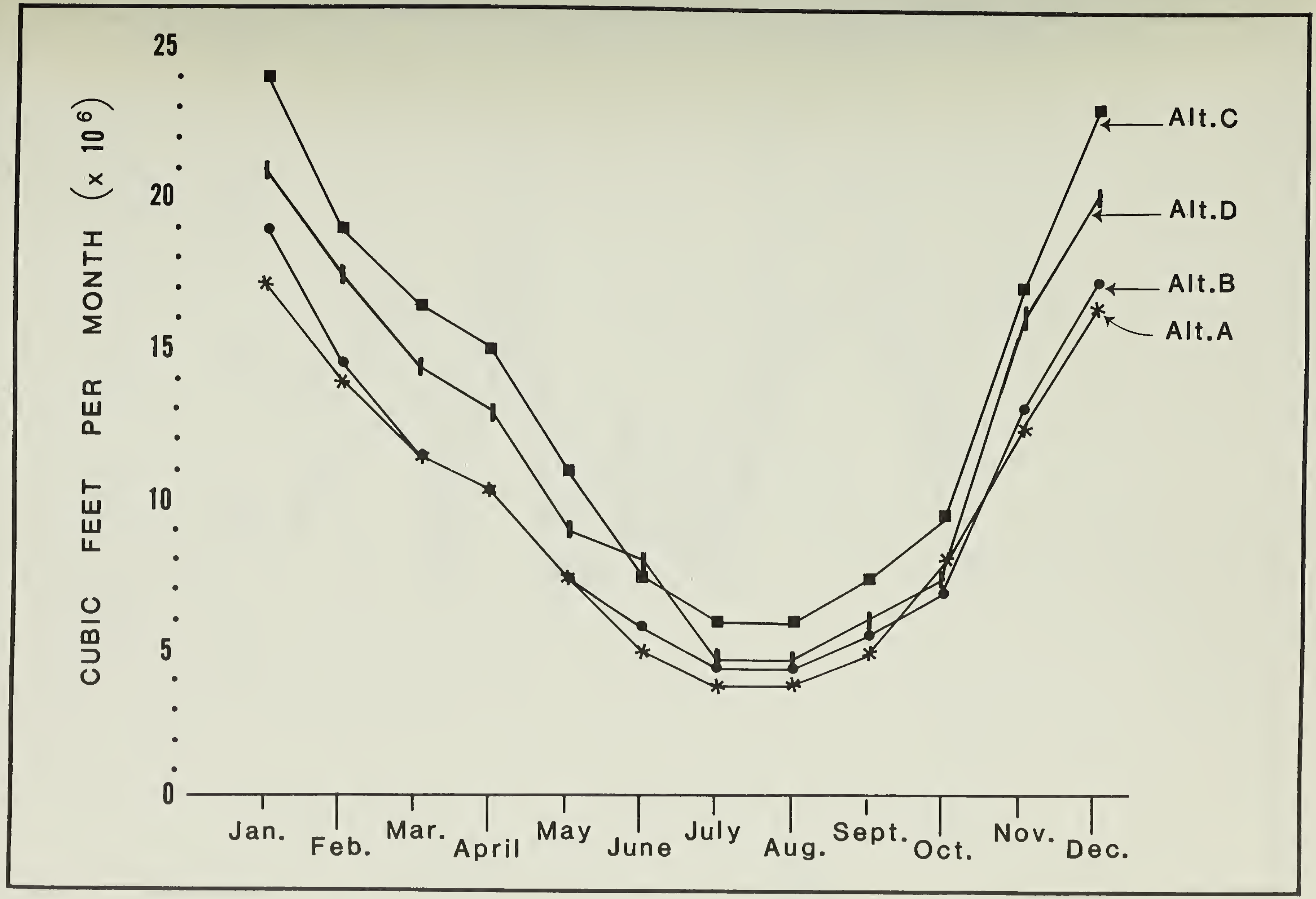


ANNUAL ELECTRIC ENERGY CONSUMPTION, FULL DEVELOPMENT	45



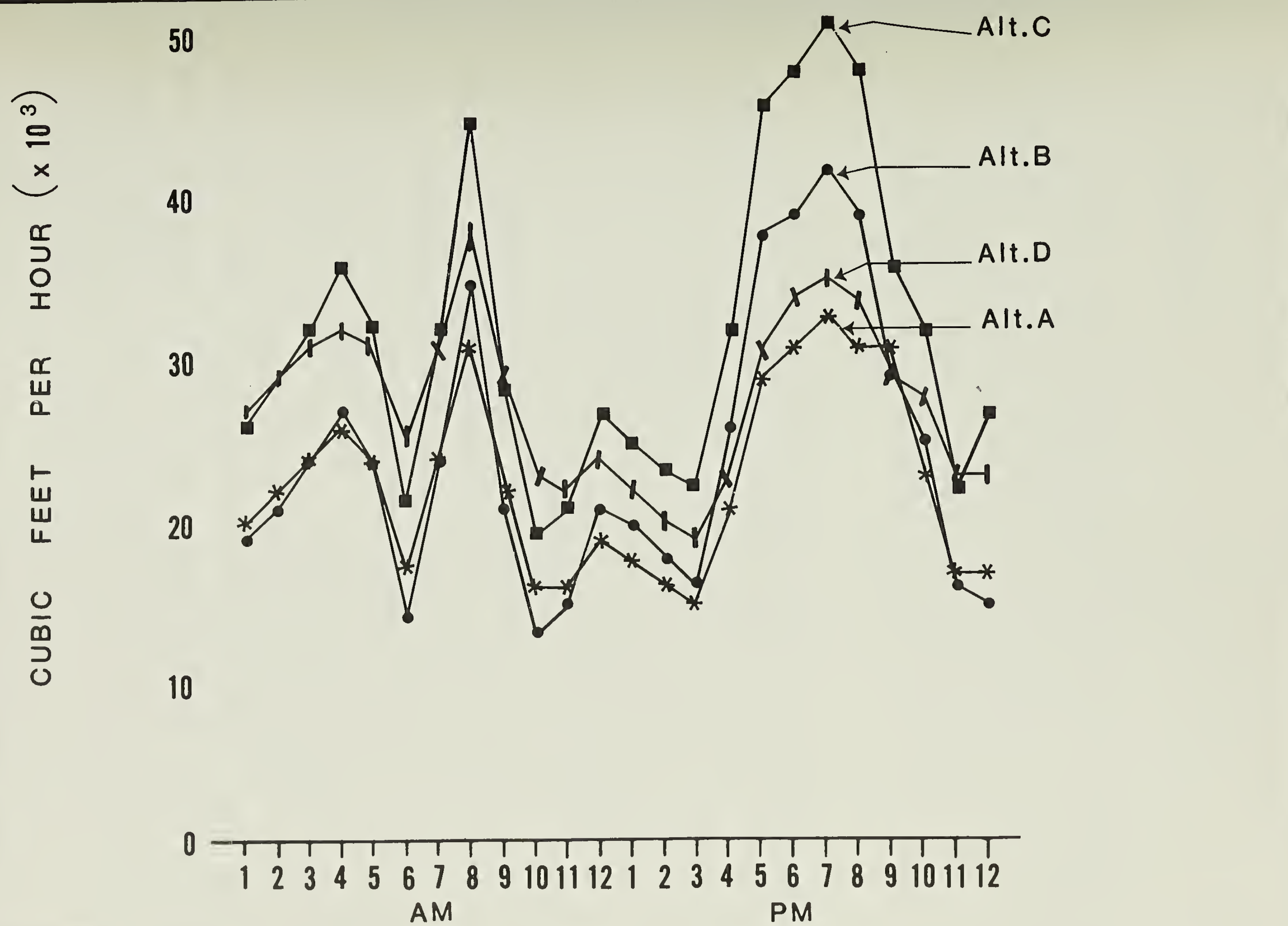
DAILY ELECTRIC DEMAND, FULL DEVELOPMENT

46



ANNUAL NATURAL GAS CONSUMPTION, FULL DEVELOPMENT

47



DAILY NATURAL GAS DEMAND, FULL DEVELOPMENT	48

for about seven years (until 1995) as the vehicle fleet gains in fuel efficiency, and then level off at about 85% of the 1988 projected use.

Alternative A

In 1980, annual overall energy use would be substantially the same as at present (Table 27, Section V.I, page 187). The addition of the convention center would increase electrical energy use by about 10% and would require the use of fuel oil. There would be an increase in vehicle miles travelled; however, the resulting increases in fuel energy use would be partially offset by the increasing average fuel efficiency of the auto fleet.

In 1988 this alternative would require an annual equivalent energy commitment (at source) of 4.5 trillion British Thermal Units (BTU), which represents an increase of 3.2 trillion BTU over the amount of energy which would be consumed by the non-discretionary uses (Table 65). About 60% of this commitment would be for vehicular energy use. Table 66 gives the percentage of non-vehicular energy consumption by use. Because of the likelihood of large buildings, this alternative would have a larger commitment to the use of fuel oil than to the use of natural gas. Office uses of electricity would constitute over 55% of the daily electric peak demand and over 60% of the annual electric peak demand. Residential uses of natural gas would constitute almost 70% of the daily natural gas peak demand and about 40% of the annual natural gas peak demand. The Redevelopment Agency tentative proposal, with the 900 additional dwelling units and 1,250 parking spaces replacing some office and commercial uses would have overall energy impacts less than those of Alternative A and more than those of Alternative B. Natural gas use would be higher in the tentative proposal than in Alternative A and fuel oil and electricity uses would be lower than in Alternative A. The convention center energy uses would be the same as in Alternative A.

The convention center is estimated to require about 9.8 million kilowatt hours of electricity per year[2] (0.1 trillion BTU), about 80,000

TABLE 65

ESTIMATED ANNUAL ENERGY IMPACT IN BRITISH THERMAL UNITS ($x10^{12}$), YBC, FULL DEVELOPMENT

ALTERNATIVE	EQUIVALENT ENERGY USE*	MINUS NON-DISCRETIONARY** ENERGY USE	= IMPACT
A	4.5	1.3	3.2
B	2.9	1.3	1.6
C	1.8	1.3	0.5
D	4.6	1.3	3.3

*See Table 64, "Total" column.
**Existing, under construction, and committed uses.

TABLE 66

NON-VEHICULAR ENERGY USE (%)

USE CATEGORY	ALTERNATIVE A	B	C	D
Office				
Electric	49.	47.	40.	63.
Gas & Oil	9.5	8.7	7.1	12.
Commercial				
Electric	14.5	1.0	18.6	4.2
Gas & Oil	2.8	1.5	4.3	1.0
Light Industrial				
Electric	7.5	6.7	10.	12.5
Gas & Oil	2.8	1.9	2.9	4.2
Residential				
Electric	4.7	2.9	4.3	1.0
Gas & Oil	3.9	7.7	12.9	2.6
Convention Center				
Electric	5.6	21.*	0	0
Oil	0.6	1.0	0	0

*Includes recreation/entertainment park

gallons of fuel oil per year[3] (0.012 trillion BTU) and about 2.3 million gallons of vehicle fuel per year (0.52 trillion BTU). Thus the estimated annual equivalent energy use (at source) by the convention center would be about 0.63 trillion BTU, which would be about 14% of the energy use of Alternative A. The annual and daily electrical demand curves for the convention center would be similar in shape to the curves for Alternative A, except that the daily peak demand would persist about two hours longer (until 7 p.m.). The convention center use would constitute about 10% of the daily electric demand peak and about 8% of the annual electric demand peak for Alternative A at full development.

Several of the variations upon this alternative might affect energy use. The development of a recreation/entertainment park instead of a public park would increase the electrical energy demand by about 12 million kilowatt hours per year[4] (coincidentally, this would make the annual and daily electric demand curves for Alternative A essentially congruent with those of Alternative D). This would also increase the vehicular fuel use to some extent. The deletion of the convention center would save the energy commitments outlined above; however this assumes that the use of CB-3 would be only for park purposes.

If the convention center were built partially or wholly above ground, it would still have to meet the same energy conservation standards as the below-ground center in terms of annual at-source energy use per square foot of building. Thus the maximum energy use for the center would be the same. If the same structure were moved above ground it would require increased electricity to cool the building and increased fuel oil to heat the building and would probably exceed state standards. Thus a convention center built above ground would have to be a different and better insulated building than currently is proposed.

The use of "people movers" would require some form of energy. The overall energy commitment of such systems depends upon the type of mover selected and upon the use to which it would be applied. The most efficient type of "people mover" might be an individually operated separate vehicle (probably powered by electricity) which would require energy only upon demand, and which might facilitate the use of public transit for YBC

access. Such a system might result in an overall energy saving by encouraging a reduction in vehicle energy use by private vehicles, especially for infirm or handicapped individuals who might otherwise not be able to use public transit. On the other hand, a continuously operating "people mover" which did little or nothing to facilitate the use of public transit (e.g., only facilitated movement within YBC) would only substitute the use of fossil fuel energy for muscle power.

Another variation, the possible reduction in off-street parking spaces, might result in an initial increase in vehicle fuel use as drivers "cruised" the area in search of remaining parking facilities. In the longer term the increased inconvenience of parking could result in more use of public transit for access to YBC, thus tending to reduce vehicle energy use.

Alternative B

In 1980, the energy use of this alternative would be similar to that discussed for 1980 in Alternative A (above), including the discussion about the convention center.

In 1988, this alternative would require an annual equivalent energy commitment (at source) of 2.8 trillion BTU, which represents an increase of 1.6 trillion BTU over the amount of energy which would be used by the non-discretionary uses (Table 65). About 65% of this commitment would be for vehicular energy use. Table 66 gives the percentage of non-vehicular energy consumption by use. Because of the likelihood of smaller buildings than those in Alternative A, this alternative would have a larger commitment to the use of natural gas than to the use of fuel oil. Office uses of electricity would constitute about 50% of the daily electric peak demand and over 60% of the annual electric peak demand. Residential uses of natural gas would constitute over 80% of the daily natural gas peak demand, and about 60% of the annual natural gas peak demand. The energy requirements of the convention center are outlined in the discussion of Alternative A (above).

The energy requirements of the recreation/entertainment park would be largely for electric energy; about 12 million kilowatt hours of electricity per year[3] (0.12 trillion BTU). While the demand for electric energy would be fairly constant throughout the year, the daily demand peak would begin in the afternoon and continue until 9 or 10 p.m.

If the Redevelopment Agency tentative proposal included a recreation/entertainment park in the central blocks as well as housing and parking uses replacing office uses proposed in Alternative A, the energy requirements would be similar to those of Alternative A and the recreation/ entertainment park requirements would be the same as Alternative B. Although the amount of office space would be similar to that in Alternative B, the office buildings would be like those proposed in Alternative A and would use more fuel oil and less natural gas than under Alternative B. The residential uses of natural gas would be the same as in Alternative B.

Several of the variations upon this alternative which might affect energy use are discussed or implied in Alternative A (above), including: public park instead of recreation/entertainment park, no convention center, convention center partly or wholly above ground, "people mover" and reduced off-street parking. The possible deletion of the apparel mart would reduce the demand for electricity and natural gas in proportion to the reduction in square footage.

Alternative C

In 1980, the energy use of this alternative would be similar to that discussed for 1980 in Alternative A, except that the discussion about the convention center would not apply.

In 1988, this alternative would require an annual equivalent energy commitment (at source) of 1.8 trillion BTU, which represents an increase of 0.5 trillion BTU over the amount of energy which would be consumed by the non-discretionary uses (Table 65). About 61% of this commitment would be for vehicular energy use. Table 66 gives the percentage of

non-vehicular consumption by use. Because of the likelihood of smaller buildings than in the other alternatives, this alternative would be almost entirely committed to the use of natural gas as opposed to fuel oil. Office uses of electrical energy would constitute 55% of both the daily and annual peak demands. Residential uses would constitute about 80% of the daily natural gas peak demand and just over 50% of the annual peak demand.

The variations upon this alternative which might affect energy use are discussed in Alternatives A and B (above) including: inclusion of the convention center and recreation/entertainment park. It should be noted that because the increased commitment for energy use (i.e., over the amount used by non-discretionary uses) of this alternative is low, the addition of both these elements would almost double the energy impact of this alternative.

Alternative D

In 1980, the energy use of this alternative would be similar to that discussed for 1980 in Alternative A (above) except that the discussion about the convention center would not apply.

In 1988, this alternative would require an annual overall energy commitment of 4.6 trillion BTU, which represents an increase of 3.3 trillion BTU over the amount of energy which would be consumed by the non-discretionary uses (see Table 65). About 60% of this commitment would be for vehicular energy use. Table 66 gives the percentage of non-vehicular energy consumption by use. Because of the likelihood of larger buildings than those in Alternatives B and C, this alternative would have a larger commitment to the use of fuel oil than to the use of natural gas. Office uses would constitute almost 75% of the daily electric peak demand and almost 80% of the annual electric peak demand. Residential type uses of natural gas would constitute almost 60% of the daily natural gas peak demand; office uses would constitute the largest single component of the annual natural gas peak demand (almost 45%).

Energy Used in Construction

As little is known about the types of structures likely under each alternative, it is only possible to make a rough estimate based upon the total square footage of structures to be constructed in each Alternative. This estimate is shown in Table 67. It indicates that Alternative C would require the smallest amount of energy to construct. The other alternatives in order of increasing construction energy are Alternative B, Alternative A and Alternative D. The Redevelopment Agency tentative proposal would fall between Alternatives A and B in construction energy required. This aspect of construction energy appears to be equal to about 10% or less of the total energy usage of each alternative (assuming a 50 year building life).[5] Another aspect of construction energy, which cannot be quantified at this time, is the amount of energy used for excavation and removal of earth in foundation construction. For the convention center (Alternatives A and B) and high rise buildings, these excavations can be tens of feet deep. Further, an appropriate site for the disposal of the excavated material would necessarily be at some distance from the YBC area. For example, some localities as far away as Richmond are under consideration for disposal of the material from the convention center site.

TABLE 67

CONSTRUCTION ENERGY, BTU (x 10^{12}), YBC STRUCTURES, FULL DEVELOPMENT

Alternative	Energy
A	10.2
B	4.9
C	2.8
D	12.2

2. WATER

1980

Existing YBC uses currently require 0.132 million gallons of water per day (mgd) (48.1 million gallons (mg) per year).[6] By 1980, the

estimated consumption by existing buildings, those under construction, and those buildings committed for development by 1980 would be 0.214 mgd (78.5 mg per year) (refer to Table 68). No further development is scheduled for completion in this time period under Alternatives C and D. In Alternatives A and B and the Redevelopment Agency tentative proposal, the convention center would be in operation, however, and would require,[7] in conjunction with the landscaped park area above it (Alternative A--or temporary landscaping in Alternative B), 0.041 mgd (14.8 mg per year) for a total water demand of 0.256 mgd (93.4 mg per year). This would be 0.23% of the San Francisco average daily demand of 110.7 mg in 1976.

1988

Assuming normal water supply conditions, by 1988 water consumption by existing buildings and committed uses would total 0.25 mgd (see Table 69). Consumption under Alternative A would be slightly lower than under Alternative D, which would have the highest water usage, but peak demand would be higher due to the intermittent convention center use by up to 30,000 persons per day.[8] The factor normally used by the San Francisco Water Department to estimate peak demand from average daily demand is 1.6, averaged over all land uses. The special circumstances associated with the convention center would effectively raise the factor for the whole Redevelopment Area to 1.7. Offices would account for over 60% of the water consumption under Alternative A. If the Redevelopment Agency tentative proposal included central block development as proposed in Alternative A, and replaced some office and commercial space with housing and public parking, water usage would be about the same as in Alternative A because of the disproportionate use of water in residences.

Discretionary development under Alternative B would consume about 60% of the water used under Alternatives A or D. The factor for peak demand relative to average daily demand (1.9) would be highest under this alternative due to weekend use of both the recreation/entertainment park and convention center.

Alternative C would have the lowest water consumption, about 43% of the use under Alternatives A and D. Housing would use almost one-half of the water consumed. (Refer to Appendix I for water consumption generation factors.) If the Redevelopment Agency tentative proposal included the recreation/entertainment park, the water consumption would be similar to that in Alternative B.

TABLE 68

PROJECTED WATER CONSUMPTION BY YBC: 1980

ALTERNATIVE	EXISTING USES	COMMITTED USES	DISCRETIONARY USES		TOTAL CONSUMPTION	
	mgd	mgd	mg/year	mgd	mg/year	mgd
A	0.171	0.044	14.8	0.041	93.4	0.256
B	0.171	0.044	14.8	0.041	93.4	0.256
C	0.171	0.044	----	-----	78.5	0.214
D	0.171	0.044	----	-----	78.5	0.214

TABLE 69

PROJECTED WATER CONSUMPTION BY YBC: 1988

ALTERNATIVE	EXISTING USES	COMMITTED USES	DISCRETIONARY USES		DISCRETIONARY CONSUMPTION AS A PERCENTAGE OF ADD***		DISCRETIONARY PEAK DEMAND	TOTAL CONSUMPTION YBC		TOTAL CONSUMPTION AS A PERCENTAGE OF ADD***	
	mgd	mgd	mg/year	mgd	S.F. Only*	System-wide**	mgd	mg/year	mgd	S.F. Only*	System-wide**
A	0.171	0.074	464	1.27	1.12%	0.46%	2.16	554	1.52	1.37%	0.55%
B	0.171	0.074	288	0.79	0.71	0.29	1.51	378	1.03	0.93	0.37
C	0.171	0.074	200	0.55	0.50	0.20	0.88	290	0.79	0.71	0.29
D	0.171	0.074	470	1.29	1.20	0.47	2.06	559	1.53	1.38	0.55

*San Francisco average daily demand was 111 mgd in 1976. For worst-case analysis of YBC percentage, assumed to remain constant.
**San Francisco Water Department systemwide average daily demand was 276 mgd in 1976. For worst-case analysis of YBC percentage (highest percentage), consumption is assumed to remain constant.
***ADD = Average Daily Demand.

FOOTNOTES

[1]Batham M.D., D.J. Ames, R.D. Smith, and E.C. Shirley, 1976, An Interim Procedure to Evaluate Transportation Energy, CALTRANS, Sacramento CA-DOT-7082-76 (Table 1 and Table 5). ERCDC, 1977, Energy Conservation Standards for Non-Residential Buildings and Staff Report, Energy Resources Conservation and Development Commission, Sacramento. (p. 2-3 Section T20-1474).

[2]C.H. Shalley, Project Electrical Engineer, The Engineering Enterprise, September 6, 1977, letter.

[3]W. Takahashi, Engineer, Hayakawa and Associates, August 22, 1977, telephone communication.

[4]R. Gryziec, Architect/Planner, August 5, 1977, letter.

[5]Post-earthquake construction began in 1906 in the YBC area and demolition began in about 1965, a period of between 50 and 60 years.

[6]From records of the San Francisco Water Department, June 1976-May 1977. Because of conservation during two months of this period, this rate is lower than it would be in a normal year (about 5-10% low, averaged over the year).

[7]Assuming a startup annual attendance in 1980 of 375,000 people and 400 employees. (Derived from a convention center use flow chart for 1981/2 prepared by R. Sullivan, General Manager, San Francisco Visitors and Convention Bureau, letter dated August 18, 1977).

[8]Peak attendance estimate provided by R. Sullivan, General Manager, San Francisco Visitors and Convention Bureau, telephone communication, August 22, 1977.

J. GEOLOGY-SEISMOLOGY

Alternative A

The most detailed discussion of impacts appears under Alternative A. The discussions for the other alternatives emphasize changes in impacts, to avoid repetition.

Under Alternative A, highrise buildings would probably be constructed in CB-1 and CB-2 and in the eastern blocks. The unconsolidated (loose debris) geologic materials in these areas form a poor foundation base because of low bearing strength, compressibility or liquefaction potential; pilings or some other means of stabilizing the buildings would probably be necessary. The Colma Formation is the usual foundation base for highrise buildings in the area.

The convention center would require the most excavation: an estimated 630,000 cubic yards of earth, an area which measures approximately 850 feet by 570 feet, and a depth of -22 feet (below San Francisco datum). The dewatering (the pumping out of water from a construction site) of the convention center site and other highrise building sites might produce some local subsidence but there would probably be no impact on most buildings. Local subsidence might damage older brick and masonry buildings, such as St Patrick's Church and the Jessie St. Substation, and underground utility lines, e.g., sewer lines, water lines and power lines.

The southeastern portion of YBC in SB-3 and SB-4, a site in which bedrock outcrops at or near the surface, would form a stable foundation base for the planned industrial and parking structures. The southwestern portion of the project area, including parts of SB-2 and WB-3 and all of SB-1, is a site of weak foundation material and potential subsidence. The structural engineering of housing in this area would have to take into account the potential instability of artificial fill, sand and bay mud in a major seismic event. Pilings, grouting to bedrock, or some other stabilization method would probably be required.

The greatest potential earthquake hazard would likely be in the southwestern portion of the project area where liquefaction and subsidence might occur (See Figure 28, page 203). Reinforced concrete buildings in the area might be structurally damaged by a major earthquake (an earthquake with a Richter magnitude of 6 or greater) but collapse would not be anticipated. Damage from a major earthquake is likely to be less severe elsewhere in YBC where ground shaking would be less intense and subsidence and liquefaction potential would be less. Older brick buildings in the area might be damaged with some collapse of walls and cornices. A safety hazard during an earthquake in the areas of highrise buildings would arise from the probable shower of glass and other debris from building facades. Plans for the apparel mart in CB-2, and the proposed highrise on the Market St. frontage west of the pedestrian concourse in CB-1, indicate that those structures would be built up to the property line. Such buildings are Risk Level 2 structures in the Community Safety Plan; under the guidelines of Policy 1 of the plan it is stated that, "Failure of mechanical or architectural elements . . . should not cause loss of life" (Community Safety Element, San Francisco Department of City Planning, 1974, p. 41). The fall of debris from the facades of these structures might pose such a hazard to life on the streets below the towers and thus would not be in conformity with the Community Safety Plan. If lateral landsliding occurred, water mains and pipes and other underground utility lines might be broken. Streets might buckle or crack in the portion of YBC (about 90%) which is built upon unconsolidated sediments.

Under Alternative A, the greatest loss of life and injury from an earthquake probably would occur if a major earthquake occurred during the daytime when workers would occupy the offices, retail-commercial, light industrial and downtown support buildings. Alternative A would have the next to highest daytime population of all four alternatives.

If a major earthquake should occur during construction of buildings, there is a potential hazard for collapse of excavation pit walls and liquefaction of the sands and muds of the area. Quicksand conditions might occur locally.

A possible hazard from lateral movement of geologic materials, particularly the bay mud, could occur during excavation of a building site. Such movement could occur because of the exposure of a free face in the pit wall. The weight of the overlying earth materials and buildings could exert a pressure upon the muds which could initiate a movement into the pit. The mud, in effect, would be squeezed out into the excavation pit. Such lateral movement could occur at any time, but the hazard would be greatest if the material were saturated with groundwater or if an earthquake occurred.

Alternative B

The restrictions imposed by geology upon construction of buildings under Alternative B would be the same as those discussed under Alternative A. Excavations and dewatering probably would be required for highrise buildings in the central, eastern and western blocks. A smaller area would be excavated under the Alternative B plan because of the construction of a recreation/entertainment park instead of the office-commercial entertainment-hotel complex in CB-2. The housing site in SB-3 is a stable bedrock area; this would reduce the hazard from ground shaking during an earthquake.

Alternative B would result in a larger resident population and a lower daytime office worker population in the project area than Alternative A. Thus, a large earthquake could pose more of a nighttime hazard to personal safety and less of a daytime hazard than would be the case in Alternative A.

The Redevelopment Agency November 1977 tentative proposal would be similar to Alternative B in having a larger resident population with accompanying nighttime safety hazards. The office worker population would be less than in Alternative A, but more than in Alternative B if housing and public parking replaced office space and CB-2 and -3 remained as in Alternative A. If the tentative proposal also provided the recreation/entertainment park in CB-2 and -3, the daytime office worker population would be similar to that in Alternative B; the tentative proposal would pose less of a daytime office safety hazard than in Alternative A.

Alternative C

Alternative C would provide for less-intensive use of YBC than the other alternatives (with the exception of the no-action variant of Alternative D) in terms of the total amount of construction and the average number of people in the area over the course of the day. Thus, the geologic impact and the hazards to safety are likely to be the smallest of the four alternatives.

The number of high-rise buildings (which would require the most site excavation and dewatering other than the convention center) would be lowest under this Alternative. The public housing planned for the peripheral blocks would be located mostly in areas of unconsolidated sand, mud and artificial fill; it would require appropriate engineering to guarantee the stability of those structures in a major earthquake. Liquefaction and subsidence would pose a hazard for housing in SB-1 and SB-2 and in EB-2, in particular. The additional housing elsewhere in YBC would be located on potentially less-hazardous sites. The housing which is planned for SB-3 would have the least hazard because it would be built on bedrock.

The geology of the central blocks would pose no special problems for construction of the parks.

Under Alternative C, earthquakes would probably pose the least hazard of the four alternatives. The Alternative C plan would provide for more permanent inhabitants who might be affected by a major earthquake at any hour than would be the case in the other alternatives. Population changes over the course of a day would be smaller than in the other alternatives because of the smaller amount of office space, the lack of a convention center and recreation/entertainment park and the fewer retail commercial establishments. Thus, a major earthquake occurring during the daytime would not affect as large a population as it might under the development of the other alternatives. Because of the construction of fewer buildings under this Alternative, the hazard of injury resulting from falling glass and other debris would be lessened.

Alternative D

Alternative D would permit the most intensive use of YBC and thus would have the greatest potential seismic safety hazard of all four alternatives. The Alternative would permit extensive construction throughout the area and highrise buildings in the central, eastern and western blocks. More large structures would have to have pilings or be grouted to bedrock under Alternative D. More highrise building construction would probably require extensive excavation and dewatering of the unconsolidated materials.

Local subsidence and differential settling might occur, particularly in the southwestern portion of YBC where artificial fill overlying bay muds forms the surficial material.

Ground shaking during a major earthquake probably would cause moderate damage to the newly constructed buildings but would not result in collapse. Alternative D would create the largest day-night variation in population in the area of all four alternatives. If a major earthquake occurred during the daytime on a weekday when the area would be most crowded, the amount of injury and loss of life could be great. On the other hand, if an earthquake were to occur at night or on a weekend, the population of the area probably would be small so that injuries would be fewer.

An earthquake-induced hazard to people might be falling glass and debris. Structural damage might occur in older brick and masonry buildings. Such buildings, which are located in the southwestern portion of YBC where violent shaking may be expected in a major earthquake, would probably experience the greatest damage. Further, liquefaction and uneven subsidence might occur in that area. Less damage probably would occur elsewhere in YBC where ground shaking would probably be of lesser intensity.

Under the no-action variant of Alternative D, geologic impacts and seismic safety hazards would remain as they are at present.

K. HYDROLOGY

Alternative A

The most-detailed discussion of hydrologic impacts appears under Alternative A. The discussions for the other alternatives emphasize changes in impacts, to avoid repetition. New construction of large structures and highrise buildings throughout all but the southeastern portion of the project area (where the surface consists of bedrock outcrops) would require excavation and dewatering. Construction of the underground convention center in CB-3 would require that the water table be lowered to an elevation of -30 (below the San Francisco datum). The water table would be lowered in the surrounding area for a period of about two years. The lowering of the water table during construction is not expected to have a permanent impact on the ground water levels. Temporary saltwater intrusion may occur to some extent during dewatering in the area. Groundwater pumped during the dewatering operations would be channeled into the sewer lines in the area. If the groundwater has much sediment it could deposit sediment in the sewer lines and result in their partial clogging. As no wells are known to exist in the redevelopment area, no impact on use of the groundwater is expected.

Building construction as proposed in Alternative A would reduce the amount of permeable soil surface, essentially to that existing before the 1972-73 demolition. Surface runoff would be channeled for the most part into the storm and sewer system. The site would continue to have a potential hazard of stormwater overflows. HUD approval of housing development in YBC may depend upon the City's ability to protect against such overflows and the possible health hazard which might result from the flow of raw sewage in the streets in large storm peak runoff periods.[1] New buildings with deeply laid foundations, such as highrises and the convention center, might have a problem with seepage. Underdrain sump systems would undoubtedly be required for such structures.

Alternative B

The impacts relating to dewatering probably would be much the

same as in Alternative A. The construction of the recreation/entertainment park in CB-2 would create little impact upon the groundwater conditions of the area, while providing for about eight acres of permeable surface in the center of YBC. The apartment housing areas in the eastern, western and southern blocks would have more permeable surface than under the uses planned in Alternative A. The overall impact would be to allow more water to be absorbed by the earth during storms, and less surface runoff into the storm and sewer system. The water table probably would not change much from its present height.

The Redevelopment Agency November 1977 tentative proposal would have effects similar to those of Alternatives A and B. The additional housing areas in the same locations as in Alternative B would provide more permeable surface than would Alternative A. If a recreation/entertainment park were constructed as part of the tentative proposal or as a variant to Alternative A, the impacts would be similar to those of Alternative B.

Alternative C

The less-intensive use of the site provided for in Alternative C probably would create the smallest impact on hydrology of the four alternatives. The two-block park in CB-2 and -3 and the open spaces associated with housing in the eastern, western and southern blocks would enlarge the amount of permeable surface in the area. Thus the amount of fresh water percolation into the ground would likely increase, other factors being equal. The water table might rise locally in the long-term.

Alternative D

As Alternative D provides for more extensive construction of structures than the other alternatives, it may be expected to have the greatest impact upon hydrology. Most of the land area would probably be covered with impermeable surface, including buildings, parking lots, streets and sidewalks. Almost all of the surface runoff from storms would be channeled into the storm and sewer system. The construction of highrise office buildings, apartment houses and downtown support

structures would probably require the largest excavation and dewatering program of all four alternatives. The dewatering would at least temporarily lower the water table. Under the No-Action variation, hydrology would remain unchanged in the area.

FOOTNOTES

[1] H. Blaser, Regional Civil Engineer, U.S. Department of Housing and Urban Development, Sacramento, California, telephone communication, August 26, 1977.

L. ECOLOGY

Construction effects under all alternatives would occur on a continuing basis over a number of years, reaching completion by 1988. At the same time landscaping would occur on portions of the redevelopment area where construction was complete.

Alternative A

In 1980, construction of the convention center (and several other structures) would be complete, including the initial establishment of landscaping covering eight acres on the surface level of the convention center. This landscaping would probably include about 500 trees as well as about six acres of lawn, flowerbeds, and shrubs.

In 1988, construction activities would destroy all of the weedy vegetation in the Redevelopment Area, forcing birds to leave the area and resulting in an overall decline in their numbers proportional to the loss of habitat. Construction activities also would destroy many old sewer lateral lines, forcing the rat population now inhabiting those lines into adjoining structures and (temporarily) stimulating the need for rat control efforts by nearby property owners.

Following construction, vegetation would center on a landscaped pedestrian concourse extending from Market St. to Howard St. (mid-block between Third St. and Fourth St.) and on the surface level of the convention center. Vegetation would probably include about 1,400 trees (assuming that street trees would be placed at 25 foot intervals and that there would be one tree for every 625 sq.ft. of landscaped area) and about six acres of lawn, flower beds and shrubs. Most of the plants would probably be non-native species commonly used for landscaping in the region. Animals under these conditions would be restricted to insects; to birds tolerant of the urban setting, including the domestic pigeon, house finch, English sparrow and Brewer's blackbird; and to common soil animals.

If a recreation/entertainment park were constructed over the convention center, the total number of trees would drop to about 1,250, and lawn area would probably also be reduced, resulting in proportional reductions in wildlife populations. See Alternative B following for other implications.

Alternative B

In 1980, the effects of this alternative would be about the same as under Alternative A. In 1988, construction effects would be similar to those of Alternative A.

Following construction, vegetation would center upon the two block recreation/entertainment park, including roughly 11 to 14 acres of landscaped area. Vegetation would include about 1,500 trees (including street trees) and about nine to 12 acres of lawn, flowerbeds and shrubs. Some concepts for development of the recreation/entertainment park would include a botanical garden, which would be likely to include primarily non-native plants. Wildlife under these conditions would be similar to that in Alternative A; however, absolute numbers might be somewhat higher due to the greater amount of vegetation.

The Redevelopment Agency tentative proposal would have effects similar to those of Alternative B if the recreation/entertainment park were constructed in CB-2 and -3; the effects would be similar to those of Alternative A if the public park (over the convention center) and the pedestrian concourse were built in the central blocks.

Alternative C

In 1980, the vegetation and wildlife populations would be similar to the present situation, as large scale efforts at establishment of a park are likely to require more time for funding. In 1988, construction effects similar to those of Alternative A would occur. If park development on CB-2 and -3 involved direct placement of fill over the existing topography, sewer laterals would not be destroyed and the rat population in those

blocks would remain. In that case, early rat control efforts would be less than those in Alternative A.

Following construction, vegetation would center on the park area in the two central blocks. Vegetation would include about 2,300 trees (including street trees) and about 15 acres of lawn, flowerbeds and shrubs similar to those in Alternative A, above. Wildlife under this alternative would be expected to be somewhat more diverse and abundant than under the other alternatives (due to the greater extent of lawn and shrubbery available). Species present would be expected to include domestic pigeon, house finch, English sparrow, Brewer's blackbird, robin, mockingbird, starling, various salamanders and lizards and red squirrel. Unless sewer laterals were removed from under the proposed park, this alternative would support a larger rat population than any of the other alternatives.

Alternative D

In 1980, the vegetation and wildlife populations would be similar to the present condition due to the time needed to return the land to private ownership and plan development for it.

By 1988, construction effects essentially similar to those of Alternative A would occur. Following construction, vegetation would consist almost entirely of street trees, including up to 900 trees depending upon what was proposed/required under the various zoning restrictions. Wildlife populations would be expected to be similar to those under Alternative A (above) except that absolute numbers would be lower because of the probable lesser extent of the landscaping (absence of pedestrian concourse, and of park space in CB-3).

M. ARCHAEOLOGIC AND HISTORIC ASPECTS

I. ARCHAEOLOGIC

This sub-section deals with archaeologic resources which may be discovered or disturbed by proposed activities in YBC.

As the YBC area has been physically modified three times in the last 125 years, it seems improbable that any prehistoric archaeological resources would remain intact within the area. There is no evidence to suggest that any vestige of the Harrison St. shellmound adjacent to YBC has survived the various stages of construction which have occurred since its discovery. However, as the probability of topographic changes in the sand hills increases as one proceeds backward in time, it is possible that artifacts dating from the prehistoric period exist within YBC. On the basis of present evidence it is impossible to document this possibility or to identify precise locations for potential sites.[1]

In the Spanish and Mexican periods, extending from 1776 to 1845, there was no activity that would regularly or even infrequently have brought anybody to the YBC area. The road between Mission Dolores and the town of Yerba Buena one mile to the north of YBC passed west and north of the area. The only potential cultural remains from this period would be individual items placed or lost in an unfrequented spot.[2]

In the early American and Gold Rush period, extending from 1846 to 1852, there were no structures south of Market St. before 1849. By the end of this period at the peak of the Gold Rush, there were about 50 structures in the YBC area, mostly small houses. Materials associated with their use left on or below the surface may still be present.[2] Between 1853 and 1906, building and rebuilding occurred in the South-of-Market district and the YBC area. From the standpoint of the existence of cultural remains, privy and privy-vault sites of the earlier part of the period are a likely possibility, except where basements were excavated subsequently. There could be small backyard dumps of the 1850s, even small basements that were graded over when structures of the 1860s and 1870s were

erected. The entire YBC area was destroyed in the 1906 fire and some buildings which had basements were replaced by new structures that did not have basements. These old basements were probably filled with debris from the site as the lots were prepared for rebuilding. These would be the most likely sites in which cultural materials from this period might be encountered.

Cultural remains of the post-1906 era may be found in basements which were filled or partially filled during the razing of buildings in YBC for redevelopment purposes, but there is little possibility that a systematic investigation of cultural materials from this period would add meaningfully to an understanding of the human experience in San Francisco.[3]

2. HISTORIC

As described in Section V. M, pages 213-217, four historic or architecturally distinctive buildings are slated for retention in the YBC area. If a decision were formally adopted by the Redevelopment Agency to have the Jessie Street Substation developed in accordance with the recommendations of the Foundation for San Francisco's Architectural Heritage, none of the four buildings would be threatened with demolition, as the other three are under owner-participation agreements or commitments which would retain them in use. The status of these buildings and their eligibility for inclusion in the National Register of Historic Places is currently under review by the State Office of Historic Preservation.

FOOTNOTES

[1]Olmsted, R. R. and N. L., and A. Pastron, 1977, Yerba Buena Convention Center, Report on Historical Cultural Resources, p. 28. On file at Office of Environmental Review, Department of City Planning.

[2]Ibid, p. 22.

[3]Ibid, p. 133.

N. COMMUNITY CONCERNS

A public participation program has been carried out concurrently with the physical, biological and socio-economic analysis conducted for this EIR. The aims of the program were to gain, from those individuals and organizations expressing an interest in YBC, an early understanding of the issues considered by them to be important, and to provide information to the public on the planning and environmental review processes for YBC.

Specific activities carried out as part of the public participation program are listed in Appendix K. They included: two major public meetings; discussions with community leaders; presentations to (and discussions with) interested community groups; distribution of flyers to residents, businessmen and property owners in the area surrounding YBC and of press releases to news media in the Bay Area; and periodic mailings (the base mailing list used for the program contains the names of approximately 380 individuals, organizations and news media) responding to questions raised by citizens and describing the status of the environmental review process.

A number of concerns regarding development in YBC have been expressed by citizens at the public meetings and presentations which were conducted and through individual communications. Areas of public concern include impacts on traffic, noise, air quality, public transportation, parking, personal safety, shopping facilities, housing for the elderly and disabled, and employment opportunities. These expressed concerns have influenced the emphasis given to the analysis and presentation of the various environmental impact categories.

Additional comments and concerns which may be articulated as a result of public and public agency review of the printed Draft EIR (DEIR) and the response to those comments and concerns will be incorporated in the Final EIR (FEIR).

VII. MITIGATION MEASURES

This section is organized in the same sequence as the Setting and the Impact sections, with the same letter designating each impact category as in those sections. All impact categories except N (Community Concerns) are represented in this section. Some subsections (for example, D. 1) are not represented.

Unless required by existing City ordinances or otherwise indicated, mitigation measures listed as proposed or under consideration by the Redevelopment Agency would apply to Alternatives A, B and C and the Redevelopment Agency November 1977 tentative proposal, but not to Alternative D.

A. LAND USE, ZONING AND VISUAL ASPECTS

Provision of more than the proposed public off-street parking facilities within YBC, to serve uses in Alternatives A and B and the Redevelopment Agency tentative proposal, would mitigate the pressure for development of such facilities outside YBC.

The quality of the total visual character and image of YBC would be guided by principles and standards, and subsequent review procedures, currently being developed by the urban design consultants (Skidmore, Owings and Merrill, Inc.) recently engaged by the Redevelopment Agency.

The Redevelopment Agency would require the allocation of 1% of construction costs of private development to public art and embellishment, in an effort to enhance the visual quality of YBC. The City Charter requirement for a similar allocation for public buildings would apply to Alternatives A and B, and to a lesser extent to Alternative C. No public buildings are included in Alternative D.

B. HOUSING AND BUSINESS RELOCATION

Housing Relocation

Under the settlement agreement in TOOR vs. HUD, a total of 1,500 housing units were to be provided in the City to help with the rehousing of people displaced from YBC. In response to this order the Redevelopment Agency has provided 1,661 units (Table 5, Page 85). To accommodate a second court settlement agreement, four additional housing sites within the YBC area have been provided; in Section V. B, these are described under the various Alternatives as Sites 1, 2, 3 and 4 (Table 7, Page 88).

The architect[1] working with TODCO on the design and landscaping of future housing would take into account the existing and projected noise levels (See Section VII. H, following). Potential problems of personal security and traffic safety affecting the area residents would also be specifically addressed in the design alternatives.

The Redevelopment Agency, the Department of Public Works and the Department of City Planning would review housing and/or landscaping plans.

Business Relocation

Pursuant to Federal relocation requirements, the Redevelopment Agency has provided financial aid to displaced businesses to help them relocate permanently within or outside the YBC area.[2]

FOOTNOTES

[1] R. Herman, Architect, Robert Herman Associates, 2420 Polk St., San Francisco, California, telephone communication, November 22, 1977.

[2] R. Kernan, Deputy Director, Redevelopment Agency, telephone communication, December 30, 1977.

C. SOCIAL CHARACTERISTICS

The addition of dwelling units under all alternatives and the Redevelopment Agency November 1977 tentative proposal would mitigate the loss of population that occurred in the South-of-Market district during the 1960s (see Section V. C. page 92). Additional residents would generate demands for commercial establishments roughly proportional to the absolute numbers of new residents. In order of decreasing numbers of residential units, the demand generated by the various alternatives would range as follows: C - B - A - D. If this demand stimulated development of local retail services, it would mitigate the shortage of nearby shopping areas for existing residents.

Specific plans to provide commercial services responding to increased demand by additional population include facilities in the housing complex at Fourth and Howard Sts., and at Fourth and Shipley Sts. (grocery stores, restaurants, dry cleaners and laundromats).

The YBC area is populated now almost entirely by low-income elderly people. Each of the alternatives would tend to broaden the population mix of the area to the extent that housing for other population groups would be provided. Subsidized-family housing would tend to add children. In order of decreasing numbers of subsidized-family units, the various alternatives would range as follows: C - B (A and D provide none).

Market-rate housing would add mostly a non-elderly population, in the following order of decreasing numbers: C - B - A (D provides none).

Combining the impacts of subsidized-family and market-rate housing, the various alternatives would mitigate the present homogeneity of YBC area demographic characteristics in the following decreasing order: C - B - A (D provides neither).

The Redevelopment Agency tentative proposal in all cases above would fall at Alternative A or B or between them.

A feasibility study is currently underway for a University of California medical center, tentatively proposed for location at the corner of Fourth and Howard Sts.[1] This facility would provide services to area residents (as well as functioning as a school of continuing education in the medical sciences), easing the possibility of case overload at the South-of-Market Clinic.

To provide for medical emergencies, especially as related to the elderly, the need for expansion and coordination of special transportation services currently provided by the Fire Department, the Department of Public Health and the South-of-Market Clinic has been recognized,[2] although there are no formal plans to improve these services. In November 1977, the Canon Kip Community House expanded its non-emergency van service which provides transportation for the elderly to medical, shopping and recreational facilities. This service, which has been functioning on a limited basis since mid-1977, now operates with 30 drivers and 17 vehicles on a 14-hour-day basis, including weekends. Supported by the Federal Department of Transportation, the San Francisco Commission on Aging, the Federal Community Employment and Training Act (CETA) and private foundations, it is able to provide free transportation to elderly South-of-Market residents by arrangement.[3]

Appendix C contains a list of the social services available in the South-of-Market area.

FOOTNOTES

[1] M. Mann, Business Development Specialist, Real Estate Division of the San Francisco Redevelopment Agency, telephone communication, December 5, 1977.

[2] South of Market Planning Task Force Report (draft), July 18, 1977.

[3] B. Armstrong, Coordinator of the Senior Center, Canon Kip Community House, telephone communication, December 5, 1977.

D. ECONOMIC/FISCAL

2. EMPLOYMENT

More jobs would be provided by any of the alternatives than were lost in YBC as a result of the 1972-73 demolition of business structures. The order of job opportunities (the largest number first) would be: D - A - B - C.

3,4. FISCAL

Mitigation of Financing Impacts

The analysis of financing impacts disclosed four situations in which YBC development could encounter financing barriers or diminish the ability of the City to finance other needs. These situations are:

1. The cost of the convention center development in Alternatives A and B could increase beyond estimated ability to pay from hotel tax allocations.

2. The pace of private taxable development in Alternatives A, B, and C could fail to add to property tax revenues rapidly enough to allow the concourse and other public areas to be financed from tax allocations.

3. The bond issue for the two-block park in Alternative C might fail at the polls so that the surrounding housing would be left to overlook vacant land and parking lots, or be delayed in development.

4. The bond issue for lease-revenue or parking-revenue bonds to finance public off-street parking might fail at the polls and weaken the incentive for commercial, retail, or office development.

The Redevelopment Agency tentative proposal would be subject to the same situations as Alternatives A and B.

This section discusses ways to prevent or respond to each of these potentially adverse situations.

a. Convention Center Financing Safeguards

The convention center cost estimate of $100 million includes an allowance for inflation at the rate of 6% a year.[1] At times during the past five years, construction costs have increased as much as 1% a month, and there is a risk that renewed inflation could push the cost of the project above the present estimates.

The present financing plan and schedule leave little headroom for cost increases. Hotel tax revenues, projected at a growth rate of 6% a year, would support the issuance of bonds up to about $85 million, versus the $78.5 million which would be needed under the present plan. This margin would disappear if the hotel tax rate increase were delayed until October 1978 or later.

A resumption of inflation would probably not be limited to the construction industry, and upward pressure on prices also could push hotel tax revenues up. Each additional 1% of inflation in hotel tax revenues would yield about $60,000 more a year for the convention center project (one-half of the $120,000 increase in total revenues). This additional income would pay for about $800,000 in additional construction costs--about $200,000 from three years of revenue during construction, and $600,000 from additional ability to support bonds;[2] it might be limited if inflation-caused recession were to reduce tourism.

A further financing safeguard could be provided if HUD would consent to wait to be paid for the convention center site until the convention center is completed. The Redevelopment Agency has advised that it does not have the right to lease the site without first paying HUD the $6.7 million rental value. If HUD would consent to take its payment, with additional interest, at the end rather than the beginning of construction, the Agency could increase the amount available for construction. At the end of construction, the Agency could sell a second

series of project bonds based on the 1981-82 level of hotel tax receipts. In the judgment of the EIR team (Bartle Wells Assoc.), actual receipts are likely to exceed the 6% annual growth projected by them for purposes of financial analysis, unless oil shortages curtail convention attendance. If construction costs are pushed by generalized inflation, hotel tax revenues are likely to be pushed by the same economic force.

b. Accelerating Concourse and Public Areas

The risk of financing these areas from tax allocation bonds is that the YBC tax base may not rise fast enough to cover bond service. The assumption used in Section VI.D.4, page 279 et seq., allowing sale of bonds in an amount 10 to 12 times the known growth in taxable valuation, stretches to the limits of bond marketability. Based on the judgment of the EIR team, (Bartle Wells Assoc.), it would be necessary to show not only the necessary tax base growth, but also to show a very high probability that taxable development would follow in short order.

Figure 49, page 455, indicates that taxable valuation would not rise enough by 1979-80 to finance all of the public areas in Alternatives A and B.[3] Moreover, there is a large margin of error in the calculations because most of the early growth in valuation would come from selling land and putting it back on the tax roll. There is uncertainty about the uses which may be permitted, the resulting value of any parcel, the time of its sale, and the length of time it would actually take to complete any taxable improvement.

Tax allocation bonds tend to be weakest at the moment of issuance, but to grow in strength as taxable development occurs or becomes firmly committed.

There are three methods to avoid the risk that public areas cannot be financed early enough with tax allocation bonds:

1. Seek and obtain state park grants to pay part of the cost;
2. Encourage adjacent developers to provide some or all of the

public areas in exchange for concessions on building densities, land price, or both; and

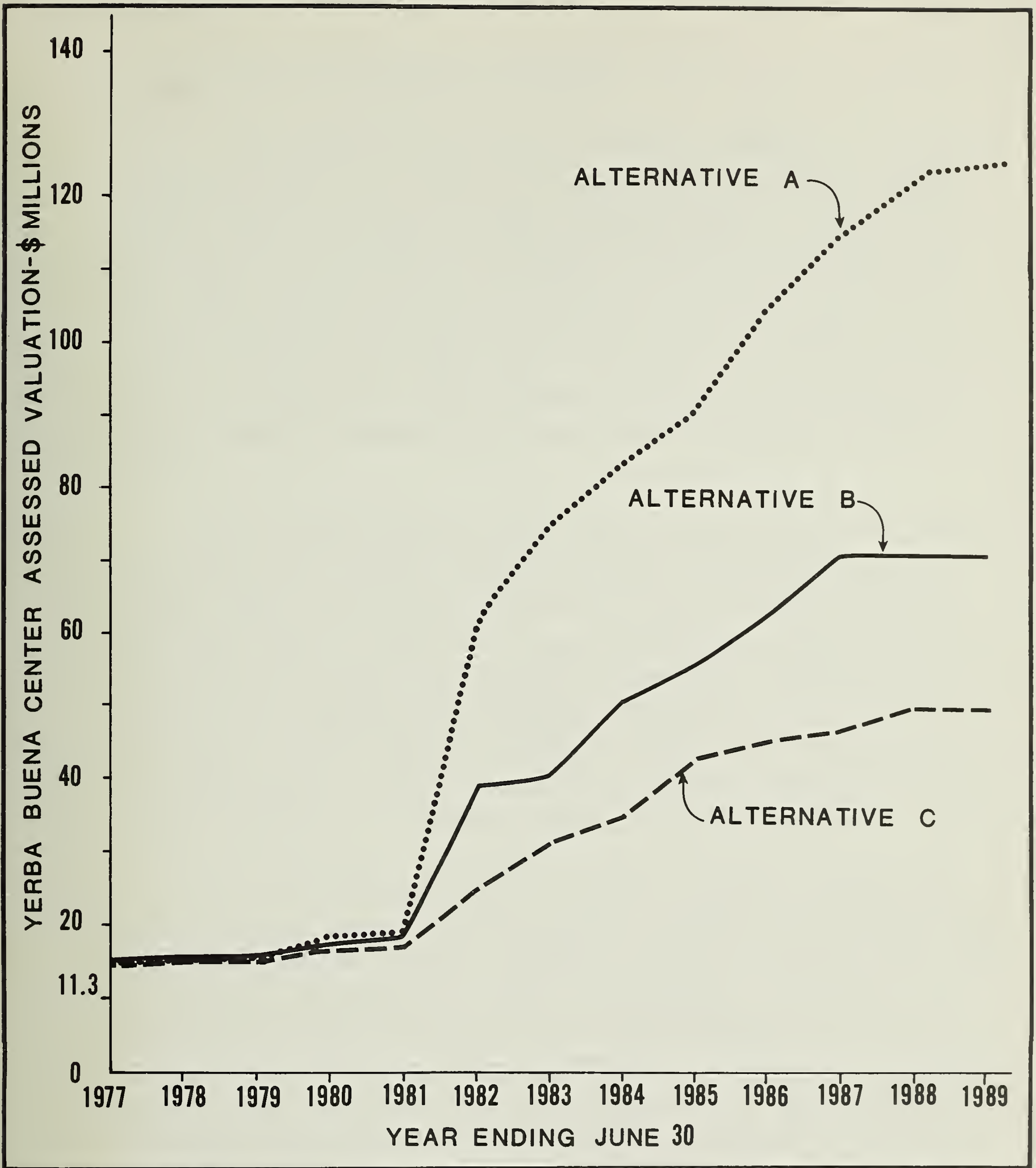
3. Pay for the public improvements from the Redevelopment Agency's land sale proceeds.

All three methods would require consent by parties other than the City. The park grant approach would involve the least local cost. The developer approach would require a developer and a willingness by the City to make concessions which could be construed as favoritism. The third approach, using land sales proceeds to stimulate early redevelopment, would require agreement by HUD and the Redevelopment Agency.

If the Redevelopment Agency were to use land sales proceeds to build the concourse and public areas as a stimulus to development, it could not repay the HUD loan from the remaining land sales revenue within three to four years as projected in the Agency's budget forecasts of September 8, 1977. The loan would have to be paid in part by delivering tax allocation bonds. With the consent of HUD, payment of the loan partially with tax allocation bonds would resolve the financing problem and speed YBC development.

c. Park Financing

Although San Francisco voters often approve bond issues and development proposals, e.g., the 1976 votes on the convention center and on low-cost housing, it would be financially hazardous to commit to Alternative C on the assumption that a $27.6 million bond issue would be approved. General obligation bonds require a two-thirds approving vote, and a successful vote can never be presumed. Probably any commitment to the kind of development planned in Alternative C would be made contingent upon success of the park bond issue, or upon the receipt of state park grants. This would decrease the possibility that residential development might proceed without assurance of the park-like central area proposed to enhance its livability.



FORECAST ASSESSED VALUATION GROWTH YERBA BUENA CENTER	49

d. Off-Street Parking Development

The garage may lend itself to phased construction. If it could be built in segments, as were the Fifth and Mission and Sutter-Stockton garages, construction could be timed to parallel demand. The demand for each stage could be measured by demand for what has already been built. There would be no need to estimate how many of today's all-day $1- to $2.50-a-day parkers would pay $3 to $5 to park in a garage, nor to speculate on the turnover among short-term parkers. The demand and the mixture of demand would vary with what is built around the garage, how much is charged, and how the pricing favored short- or long-term parkers.

Earlier studies[4] indicated there would be little risk that the garage would not be used enough, eventually, to pay all or most of its cost; however, these studies did not discuss the interim period in which the garage would have to compete with lower-cost parking on nearby areas in YBC which might remain undeveloped for some years. From a financing standpoint, the first increment of garage development would be difficult to handle even if voters approved the bonds. Revenue forecasts would have to be based largely on demand generated by proposed facilities and without a history of demand for comparable parking at comparable prices.

If the Redevelopment Agency desired to minimize the risk that parking would not be available when needed to stimulate redevelopment and to encourage provision of public facilities, it could also consider using land sale proceeds to build the first stage of the garage. The Agency could then lease the garage for operation by a private operator and use the net operating revenues to help repay the HUD loan. If necessary, HUD loan repayment could be further secured by delivery of tax allocation bonds. The Agency advises that land sales revenues are pledged to repay the HUD loan, and that their use for construction would require HUD consent.

After the first stages of garage development, subsequent expansion could be paid for from surpluses of: (1) land sales revenue, if any; (2) net parking revenues from garage increment one after repayment of the

HUD loan; (3) voluntary developer contributions in lieu of non-Code-required on-site parking; and (4) net parking revenues from each new garage increment. Initial capital, as needed to supplement land sales revenues and developer contributions, could be raised through sale of Redevelopment Agency parking revenue bonds, unvoted, or Parking Authority revenue bonds, if voted.

e. General Considerations

The foregoing discussion incorporates concepts (developed by the EIR team [Bartle Wells Assoc.]) that the Redevelopment Agency might seek HUD agreement to deferral of payment for the convention center site, and to accept tax allocation bonds in partial payment of the HUD loan. Both concepts are believed by the Agency to be contrary to its agreement with HUD; the Agency is not committed to pursue these possibilities.

The concepts are offered as a possible means of mitigating the effect of any further cost increases in the convention center and avoiding a public sale of tax allocation bonds early in YBC development.

FOOTNOTES

[1]Interviews with J. Igoe, YBC Convention Center Project Coordinator, August 29, 1977, and December 5, 1977.

[2]Estimate by Bartle Wells Associates

[3]The figure has not been corrected for the one-year slip in construction of the convention center; this does not affect the discussion of 1979-80 taxable valuation.

[4]Arthur D. Little, Inc., and URS Research Company, 1973, Yerba Buena Center Public Facilities and Private Development, Draft Environmental Impact Report, City and County of San Francisco.

E. COMMUNITY SERVICES

2. SEWERS AND SEWERAGE

- The Redevelopment Agency intends to require that all developers install low-flow toilets, urinals, taps, and showerheads to reduce the total liquid wastes discharged into the sewers.[1]

- The Redevelopment Agency would use a drip irrigation system and drought-resistant landscape materials in the park area in CB-3 in Alternative A and in CB-2 and CB-3 in Alternative C to reduce the use of water for irrigation and concomitant runoff into the storm drains.[1]

- Discharge of dewatering wastes from construction sites into the sewers must conform to the Industrial Waste Ordinance. The quality of the water would be determined and the cost of treating the wastewater (based on the water quality) would be negotiated by the Bureau of Sanitary Engineering and the contractor. The cost would be borne by the contractor.[2] Dewatering for construction under the current schedule would continue for a period of approximately two years beginning in February of 1979. The greatest amount would be discharged into the sewers between February and April, 1979.[3] Dewatering could be begun during the dry season to reduce shock loads during rain storms; if delaying the schedule were not economical, dewatering during and immediately after storms could be avoided.

- As dewatering for installation of the transport/storage sewer main system along the Embarcadero will be occurring during the period of YBC construction, all dewatering wastes during excavation and construction of the convention center would be discharged into the North Point main to avoid an overloading

of the Fourth St. Pumping Station. Turner Construction Company has agreed to comply with the recommendations of the Bureau of Sanitary Engineering in this regard.[4]

- After the convention center were completed, any dewatering done to maintain the water table at no more than -2 feet could be used for landscape irrigation and not discharged into the storm drain system. A well permit and periodic testing of the water would be required by the Department of Public Health; a back-flow preventer to prevent pumped water from entering the domestic supply would have to be installed.[5] The salinity of the water is low enough to permit its use for landscape irrigation, but other further tests would be required to determine its suitability. Use of the water would be dependent on the quality of the water and the ability of the structure to withstand changes in the level of water table. This recommendation is under consideration by the convention center engineers.[6]

4. SOLID WASTE

<u>All Alternatives</u>

- The Redevelopment Agency intends to require that all refuse, including that from housing developments, be placed in metal dumpster containers to facilitate pick-up.[7]

- Although the compacting of wastes would use energy, compacting and recycling would lessen the amount of landfill space required to serve YBC; a room would be provided in the convention center for solid-waste compaction and the storage of recyclable wastes such as glass, metal and paper. The provision of similar rooms would be encouraged by the Redevelopment Agency for buildings which would be constructed by private developers.[7]

- o Trucks carrying construction and excavation debris could have the load covered with a tarp to decrease spillage and dust. The Redevelopment Agency would not be willing to require this, due to the expense involved.[8]

- o Turner Construction Company is making arrangements to stockpile, on or near the site, the soils excavated for the convention center undergrounding, which would then be used in constructing the foundation of the convention center and for rooftop park development. This stockpiling would save landfill space and the energy which would have been required to transport the soils to and from a landfill.[9]

5. COMMUNICATIONS

<u>All Alternatives</u>

- o The Redevelopment Agency intends to require the installation of bicycle racks near the convention center and office building entrances for use by messengers.[8]

- o The specification for service driveways and space for loading delivery trucks and vans has been described in the Redevelopment Plan (p.10). Deliveries to the convention center would be restricted to a dock area and the drop-off zone on Folsom St.[8]

- o The designation of yellow-curb delivery zones near convention center, offices, light industry and downtown support buildings would alleviate congestion caused by delivery vehicles. Such designations would require the approval of the Traffic Survey Unit of the San Francisco Police Department and the Police Commission and are granted after analysis of the frequency of deliveries, the need for parking, and local traffic congestion.[10]

6. POLICE

All Alternatives

- All construction sites must be fenced under Federal Occupational Safety and Health Administration regulations; the Redevelopment Agency suggests that security guards be required at night at all construction sites to protect materials and equipment from vandalism and theft.[11] Turner Construction Company intends to have security guards for the convention center site during all hours when work is not being done.[12]

- The Redevelopment Agency intends to require security systems or bonded security guards in all subsidized housing developments to reduce burglaries and assaults and would recommend them for all other (i.e., market-rate) housing.[11]

- The Redevelopment Agency would suggest that security alarm systems be installed in all office buildings, retail-commercial establishments, and light industrial and downtown support service buildings to avoid burglaries and to reduce the demand for police services; this installation would be the responsibility of the individual developer.[11]

- Street lighting, especially on side streets, could be designed for pedestrians as well as vehicles. The Department of Public Works has delayed upgrading the lighting in YBC and would prepare lighting plans designed for pedestrian and vehicular safety once street disruption, connected with YBC construction, were finished. Any such plans would require City P.U.C. approval.[13]

Convention Center

The following security measures have been designed into the convention center:[14]

- o Vehicular and pedestrian access and egress would be controlled; all those making deliveries and pickups would pass through a security check. The Exhibit Hall would be open to the general public only for the purchase of tickets to consumer shows.

- o Each division of the Exhibit Hall floor would be capable of being completely locked.

- o The Security Office would be able to monitor all exhibit-floor exit doors. An alarm would sound if one of the doors were opened.

- o During shows, guards would be stationed at the exit doors.

In addition to the measures included in the convention center design:

- o Traffic control officers could handle traffic corners of CB-3 when heavy convention center pedestrian traffic coincides with rush hour. At the San Francisco Civic Auditorium (Brooks Hall), the hiring of such officers is done by and at the discretion of the user.[15]

- o The Redevelopment Agency intends to require that the convention center park be landscaped for visibility and well-lighted at night.[11]

<u>Recreation/Entertainment Park</u>

- o The Redevelopment Agency would suggest that the internal security force at the park be a Patrol Special, formed of off-duty, special police officers who have almost as much authority as regular officers. This force could be required to patrol after closing hours, as well as while the park is in operation, to decrease the possibility of burglaries or assaults.

The selection of a security guard force would be the responsibility of the park developer.[11]

- If the recreation/entertainment park grounds were to be unfenced, the use of shrubbery could be avoided and landscaping could be designed for visibility. The park could be well-lighted, even after closing. The Redevelopment Agency intends to submit the finished landscaping plan to the Police Department for review.[11]

Alternative C

- Police could patrol the public park on foot during the evening and night hours; this would reduce hazards for the elderly and other users of the park. The frequency and type of patrol would be the responsibility of the San Francisco Police Department.[11]

- The Redevelopment Agency intends to design the park so that benches would be avoided in the areas closest to Sixth and Market Sts.[11] and near any areas close to evening entertainment activities where undesirable loiterers might ordinarily tend to congregate.[16]

- The Redevelopment Agency intends to design the landscaping so that the entire park would be visible from the street. High-branching trees would be selected and shrubbery avoided. The park would be well lighted at night.[11]

7. FIRE

Alternative A

Convention center specifics are discussed in Appendix E.

The convention center would have fire alarm, sprinkler, standpipe, smoke removal and communications systems. It would be built of fire-resistant materials and would have an emergency power supply and water reservoir. There would be more exits from the Exhibit Hall than are required by the Building Code; some of these would be ramps. A capacity crowd of approximately 27,000 people would be able to exit the convention center in about 9 minutes in an emergency; for 6½ minutes of this time they would be within a two-hour fire-rated enclosure.[17]

Alternative B

The Redevelopment Agency has agreed to require the following mitigation measures recommended by the San Francisco Fire Dept.[18]

- For patrons of the recreation/entertainment park, provide emergency egress on all streets through one-way gates or doors; and

- Provide fire lanes and gates within the recreation/entertainment park for fire vehicle access according to Fire Department requirements.

Alternative C

None required beyond conformity to code.

Alternative D

None required beyond conformity to code.

8. SCHOOLS

Alternatives B and C

The Redevelopment Agency would recommend that the private

developer include facilities for pre-school and day care in the subsidized-family housing.[19]

9. PARKS AND RECREATION

Alternative A

- o The architect has agreed to eliminate or concentrate above-ground structural elements of the convention center.[20] This would reduce the amount of hand labor required in park maintenance and thus lower the maintenance costs.[21]

Alternative B

- o To avoid overuse of the planned Open Space Program park, the Redevelopment Agency could reserve a portion of CB-2 or CB-3 as a public park to meet the demands for park space created by YBC development. An alternative design for the recreation/entertainment park, in which no admission would be charged for entrance onto the grounds, would satisfy this need and is under consideration by the Redevelopment Agency.[1] The final decision on the form of the recreation/ entertainment park would be based upon a development agreement negotiated by a private developer and the Redevelopment Agency.[22]

Alternative D

- o A minimum of one-half of either CB-2 or CB-3 could be reserved as a public park to meet the demands created by development and to avoid overuse of the planned Open Space Program park. Such a park would have to be budgeted for and acquired by the San Francisco Recreation and Park Department,[1] subject to budgeting approval by the Board of Supervisors and the Mayor.

All Alternatives

The Redevelopment Agency would consult with the Recreation and Park Department as development proceeds and would:

- Involve Recreation and Park Department staff at the earliest possible time in all phases of park and pedestrian concourse design; and

- Incorporate ease of maintenance as one design criterion for parks and the pedestrian concourse.[1]

It is uncertain whether the Recreation and Park Department or the Department of Public Works would be involved in the maintenance of the pedestrian concourse.

10. MEDICAL SERVICES

Convention Center

- A 600 sq. ft. first-aid area would be included in the convention center. The first-aid room would be staffed by a nurse employed by the convention center. First-aid kits would be placed in the building and a mobile emergency cart would be available to the nurse and security guards to go to the scene of an accident or illness.[23]

Recreation/Entertainment Park

- Design of the recreation/entertainment park has not progressed to the point where emergency medical facilities are planned. There would be a first-aid station and emergency access to the park for ambulances.[24] A mobile emergency unit could also be available for the use of first-aid station personnel.

All Alternatives

Housing for the elderly would produce a need in YBC for transportation for the elderly, particularly those not fully ambulatory, to doctors' offices and other medical facilities. A shuttle or van service for residents could be provided by TODCO for this purpose. Block grant or general revenue sharing funds might be made available.[1] Applications for the HUD-funded block grant program must be approved by the Mayor's Office of Community Development and the San Francisco Board of Supervisors.[25]

FOOTNOTES

[1]T. Conrad, Chief Planner, San Francisco Redevelopment Agency, telephone communication, September 2, 1977.

[2]J. Crafts, Superintendent of the Bureau of Water Pollution Control, Department of Public Works, telephone communication, October 28, 1977.

[3]R. Dorais, Turner Construction Company, telephone communication, December 14, 1977.

[4]J. La Marre, Project Director for Yerba Buena Center, Turner Construction Company, telephone communication, September 2, 1977.

[5]P. Schwabacher, Health Inspector, Department of Public Health, telephone communication, November 15, 1977.

[6]W. Takahashi, Engineer, Hayakawa Associates, telephone communication, September 2, 1977.

[7]T. Conrad, Chief Planner, San Francisco Redevelopment Agency, personal interview, September 9, 1977.

[8]T. Conrad, Chief Planner, San Francisco Redevelopment Agency, telephone communication, September 20, 1977.

[9]R. Dorais, Turner Construction Company, telephone communication, August 31, 1977.

[10]Sgt. L. Etherington, Traffic Survey Unit, Traffic Division, San Francisco Police Department, telephone communication, November 15, 1977.

[11]T. Conrad, Chief Planner, San Francisco Redevelopment Agency, telephone communication, November 3, 1977.

[12] R. Dorais, Turner Construction Company, telephone communication, November 3, 1977.

[13] A. Tanner, Senior Electrical Engineer, Department of Public Works, telephone communication, November 15, 1977.

[14] MBT Associates, 1977, Program: Yerba Buena Center.

[15] J. Balzer, Manager, San Francisco Civic Auditorium, telephone communication, December 14, 1977.

[16] Sgt. E. Fowlie, Union Square Squad, San Francisco Police Department, telephone communication, October 14, 1977.

[17] Chief W. Graham, Fire Marshal, San Francisco Fire Department, telephone communication, December 14, 1977.

[18] T. Conrad, Chief Planner, San Francisco Redevelopment Agency, telephone communication, September 2, 1977. (According to the Fire Marshal, specific requirements cannot be detailed until the plans for the recreation/entertainment park are prepared and reviewed by the Fire Department.)

[19] T. Conrad, Chief Planner, San Francisco Redevelopment Agency, telephone communication, December 22, 1977.

[20] J. MacArthur, Architect, HOK, telephone communication, September 2, 1977.

[21] J. Rogers, Superintendent of Parks, Squares, and Outside Facilities, Recreation and Park Department, telephone communication, November 18, 1977.

[22] T. Conrad, Chief Planner, San Francisco Redevelopment Agency, telephone communication, December 14, 1977.

[23] P. Collins, Assistant Coordinator, Yerba Buena Convention Center, telephone communication, September 21, 1977.

[24] D. Gast, Architect, Richard Gryziec, Architect and Planner, telephone communication, September 23, 1977.

[24] T. Conrad, Chief Planner, San Francisco Redevelopment Agency, telephone communication, November 18, 1977.

F. TRANSPORTATION

Mitigation measures for transportation involve pedestrians, transit, intersection capacity, construction activities and parking. The mitigating measures are discussed for each of these transportation categories in order. Regional auto-traffic mitigation measures are discussed in Section VII.G., following.

PEDESTRIAN CONGESTION

1. Increased capacity for pedestrian movements on existing sidewalks (not under active consideration, as far as is known).

The effective width available for pedestrian movement on Third, Fourth, Mission and Howard Sts. could be increased by careful placement of sidewalk furniture, such as planter boxes, benches, newspaper racks, kiosks, etc. Where possible, sidewalks could be widened through setback of building lines in the YBC area. This would be particularly advantageous at intersection corners where bus stops are located. It is not considered desirable to widen widewalks by narrowing existing streets, as the street area is needed for moving traffic.[1] The authority for widening sidewalks in the redevelopment area by increasing setbacks would rest with the Redevelopment Agency; such widening would have to be negotiated with the property owners and/or tenants, at the time of design review of specific structures, since potential building space would be lost.

2. Increased capacity for pedestrian movements with a pedestrian walkway from the convention center to Market St. (part of plan, under Alternatives A and B and the Redevelopment Agency tentative proposal; also in CB-1 only, in Alternative C).

A pedestrian concourse is proposed in conjunction with the convention center. The concourse would penetrate all the way to Market St.; current design calls for grade separations at both Howard and

Mission Sts., and ramp access to BART in CB-1. The effective width of the concourse for pedestrian movement would be enhanced by the "furniture" placement suggested in the previous mitigation measure. This would be under the control of the Redevelopment Agency.

3. Improve the flow of pedestrians at intersections by upgrading existing traffic signal hardware (not under active consideration, as far as is known).

All of the intersections in and adjacent to YBC could be equipped with pedestrian crossing signals ("Walk", etc.) for controlling the flow of pedestrians at intersections. The timing of these pedestrian signals could be set to minimize the interference of pedestrians and right-turning vehicles, thus increasing the efficiency for both types of flow. The agency and authority to make these changes is the Department of Public Works, Division of Traffic Engineering.[1] In order to modernize the signals, the City would have to budget the necessary funds through tax moneys or with the assistance of the Redevelopment Agency. The potential benefits of a "scramble" system, already in use at peak hours at some downtown intersections, where all vehicular movements are stopped during one signal phase to allow four-way and diagonal pedestrian crossing, may also be investigated by the same agencies.

4. Improve the flow of pedestrian movements through the use of police point control at intersections (not under active consideration, as far as is known).

The major difficulty in intersection capacity where large pedestrian flows exist is the conflict of pedestrians with turning vehicles. Police officers assigned at high-volume intersections during peak hours (including those peaks associated with special convention center events) could minimize this conflict by controlling traffic directly and supplementing the existing traffic signals. Improvement in both pedestrian and mixed-vehicle flow would result. Authority for this type of traffic control comes from the Police Department; its implementation normally would call for an increase in budget, as police officers would be taken away from other required police duties.[2]

5. Increased capacity for pedestrian movements through temporary barricading and parking restrictions (not under active consideration, as far as is known).

This type of mitigation would be necessary during special activities, particularly at the convention center, to provide pedestrian access to transit and parking. Due to heavy vehicular traffic on all streets in the YBC area, this type of temporary barricading to close or narrow a street, or restrict the traffic lanes for transit use only, probably would be limited to nighttime activity (after 6 p.m.). Parking restrictions in certain areas could be allowed for temporary widening of effective sidewalks, providing this does not conflict with bus or truck-loading activities. The authority for this type of restriction would rest with the Department of Public Works and the Police Department, with the Police Department taking direct responsibility for street and sidewalk traffic control.[2] This type of control already is in use on occasion at Brooks Hall / Civic Auditorium, City Hall, and the Opera House.

TRANSIT AVAILABILITY

1. Provide additional capacity for the Southern Pacific commuter trains to meet anticipated added demand (not under active consideration).

Additional rolling stock is available which could be brought into use and increase peak hour train capacity. The authority to add additional cars would come from the Southern Pacific Company,[3] which is regulated by the California State Public Utilities Commission. If SP remains in the commute business, and if current SP policies continue, available cars would be brought into service to maintain the one-seat-per-passenger SP policy.

2. Provide additional peak hour capacity on the SamTrans bus system (not under specific consideration for YBC).

The overload that would occur on the main line (Highway 101 Route) could be alleviated by additional buses (possibly by shifts in routes) and headway changes. Also this transit ridership could partially shift to the I-280 route to San Mateo County.[4] The San Mateo Transit District is the agency controlling the assignment of additional buses; it is controlled by funds available through its taxing and revenue system. The Metropolitan Transportation Commission is the regional administrator of Federal Urban Mass Transit funds and California funds and, as such, has some degree of regulatory control.

3. Increase of capacity of the MUNI system in the Market St. corridor (Muni Metro planned; other increases under consideration).

The planned addition of the MUNI METRO will increase the Market St. corridor capacity and could attract patronage from other routes (with a transfer required). The expansion of existing aboveground service also would relieve overloads in the Market Street traffic corridor. As the MUNI system is now operating at a deficit, this would require the expenditure of additional funds not now available.[5] One potential source would be additional Federal and/or State funding to further subsidize this transit system for the benefit of all persons with a destination in San Francisco. MUNI is currently engaged in a Planning, Operation and Management Study (POM) to improve service.

INTERSECTION CAPACITY

1. Lessening of congestion at critical intersections through increased use of staggered work hours (not under active consideration).

The use of staggered working hours would spread the peak loading of traffic throughout the p.m. peak period, and would thus reduce the projected volumes during the peak 15 minutes. Implementation would normally be voluntary and would require the support of the Redevelopment

Agency, the Chamber of Commerce and downtown business associations. The Redevelopment Agency could require a policy of staggered working hours as a part of negotiating an agreement with tenants and/or property owners in YBC. Staggering of hours would also reduce peak-pedestrian levels. Some employers in the downtown area already have implemented staggered working hours ("flex-time"), partly to lessen the amount of traffic congestion that would be experienced during the evening peak hour period.[6] Since non-YBC traffic dominates the traffic on YBC streets, maximum benefits would require staggered hours beyond the YBC boundary. The possible benefits of a City ordinance requiring staggered hours in the Downtown and Financial Districts require analysis that is beyond the scope of this EIR.

2. Increasing the use of transit through toll subsidies and transit fast passes (some already underway).

These types of incentives to reduce the number of automobiles could be provided voluntarily by transit agencies and by private management. SamTrans is now selling SP commute books at reduced rates. The City of San Francisco could coordinate this measure with the transit agencies, the Chamber of Commerce and business associations to encourage the implementation of this type of policy.

3. The use of van and car pooling to lessen traffic congestion at intersections (not under active consideration).

It might be possible for the City and State to cooperate in providing high-occupancy-vehicle preferential lanes through some intersections (requires Department of Public Works recommendation to Board of Supervisors). The State has had some success in establishing car pools. A concentrated effort is necessary if carpools are to be more successful. Local government could budget funds or assign a transportation-related employee to coordinate such an activity. Van pooling may be more popular than car pooling as the van would be supplied by the agency or company for the use of its employees. One employee would be responsible for the vehicle and store it overnight at

his/her residence. Golden Gate Transit started a van-pool arrangement in December 1977. The Bank of America considered such a system, but determined that it was not desirable to institute a fringe benefit that would not be available to all employees.[7]

4. Use of shuttle buses for peak events (not under active consideration).

For peak events, the primary mitigation factor could be the use of shuttle buses to ease the impact of vehicular circulation.[8] This would be the responsibility of the organizers of the events, who could add the costs to ticket prices. Outlying parking/loading lots would have to be provided. Long-term arrangements could be coordinated (for example, with hotels) by convention center management, which could use the same lots for truck storage. (See Construction and Truck Activities, 3, following.)

5. Increased use of jitneys and taxis (not under active consideration).

Jitney service now exists along Mission Street and south to the various transit terminals. There is a transit preferential lane along Mission St.; the jitneys could be allowed to use this lane as a qualifying transit vehicle. This would require a recommendation from the Department of Public Works; the final authority would rest with the Board of Supervisors.[1] Increased use of taxis could improve the flow of traffic and lessen the need for parking. Regulation of taxis falls under the purview of the Board of Supervisors.[2]

6. Improving traffic flow efficiency through the location of driveways for off-street parking (suggestions beyond planning code requirements; the Redevelopment Agency plans to implement these as part of the Design Review process[9]).

The flow of traffic on a downtown street can be improved through the provision of access to off-street parking and loading areas. Proper location and arrangements of driveways can be an important factor. A

suggested practice in designing driveways for YBC would be to do the following (planned as part of the Design Review process[9]):

a) Place driveway openings at least 50 ft. from crosswalk locations.
b) Make driveways a minimum of 24 ft. to 30 ft. wide for two-way movements.
c) Provide for at least 50 ft. of curb between adjacent driveway locations.
d) Keep the number of driveways to a minimum with good design practice.

CONSTRUCTION AND TRUCK ACTIVITIES

1. Establishing truck routes for construction activities.

Haul trucks (spoils, construction materials) might not be permitted on important transit routes such as Mission St. and Market St. Trucks might be directed to and from the James Lick Freeway, using preferably Third and Fourth Sts., and restricted from all streets during the a.m. and p.m. peak periods. The movement of these trucks might not be permitted across Market St. in the central business district. The authority for controlling the truck activity would be the responsibility of the Department of Public Works and the Police Department.[1,2] Department of Public Works now prohibits obstruction of streets during the peak traffic periods.

2. Provision of parking for construction workers to minimize parking congestion (not under active consideration).

Construction workers might be encouraged to ride transit facilities to and from work. Provision of on-site parking would reduce localized parking demand. (Turner Construction Co., the construction manager for the convention center, has a policy that construction workers may not park their personal vehicles on the site.)

3. Locating loading areas for truck deliveries during project operations, to minimize congestion.

Truck activity associated with the convention center would be heavy during set up and take down of conventions and exhibits. During these times, off-site waiting areas for trucks could be provided when other on-site loading and waiting space is insufficient. Funding for acquiring waiting areas could be a mix of public and private money. (The private sector would consist of the companies whose trucks would use the areas.) The San Francisco Convention and Visitor's Bureau would be the organization to coordinate this measure; control would be with the Board of Supervisors.

PARKING

1. Increased use of employee car pools and transit for shopping trips to reduce the need for parking.

The mitigating factors relating to car/van pools and transit have been discussed earlier in this section of the report.

2. Adjustment of parking rates to regulate short-and-long-term parking (not under active consideration).

The most expedient method for controlling parking in the YBC area would be by regulating the short-term and long-term parking rates. For public parking, these rates would be controlled by the San Francisco Parking Authority. Private rates are somewhat flexible, although the City can influence parking rates through its taxing powers. In general, a high rate for all-day parking would discourage all-day parkers (commuters) from using such facilities, while a low hourly rate for one or two hours would permit the short-term visitor to park inexpensively.

3. Zoning ordinance controls on parking supply.

The City's zoning ordinance does not require, but actually

restricts, the provision of parking in a C-3 district. This recognizes that the solution of perceived parking deficiencies may encourage traffic congestion in the central business district. Whether additional long-term parking supply would be constructed within walking distance of YBC is an economic problem. It is recognized that shortages of parking in YBC could lead to motorists' circling the area looking for a parking place, thus wasting energy and releasing more air pollutants. Another possibility is that shortages of parking would encourage further uses of transit. Still another is that use of YBC would be discouraged for users who depend on the automobile.

FOOTNOTES

[1]S. Shoaf, Division of Traffic Engineering, City of San Francisco, telephone communication, November 8, 1977.

[2]Sgt. L. Etherington, Police Department Traffic Division, City of San Francisco, telephone communication, November 8, 1977.

[3]G. Mora, Southern Pacific Transportation Co., & E. Mohr, Metropolitan Transportation Commission, telephone communications, September 8, 1977.

[4]A. Lumley, SamTrans, telephone communication, July 21, 1977; as noted in Section VI.F., this transfer, requiring the use of BART, is contrary to City policy.

[5]T. Standing & G. Cauthen, Engineers, MUNI, telephone communications, August 19, 1977.

[6]E. Green, Transportation Planner, San Francisco Department of City Planning, telephone communication, November 8, 1977.

[7]Bank of America Data Center EIR, Department of City Planning, EE74.128, August, 1975.

[8]Transportation Strategy and Programs, 1976, San Francisco Department of City Planning.

[9]T. Conrad, Chief Planner, Redevelopment Agency, telephone communication, December 16, 1977.

G. CLIMATE AND AIR QUALITY

MITIGATION OF CHANGES IN LOCAL CLIMATE

Measures to reduce the effects of wind and shadows and decrease discomfort of pedestrian and park visitors could be developed at several scales, varying from changes in land use or building location/design to construction of small wind barriers. These measures could be developed in appropriate detail after a final plan is adopted and designs are proposed. A brief discussion of possible mitigation considerations, including a Redevèlopment Agency commitment, is presented here to provide a basis for design.

A variety of modifications can reduce exposure to wind and shadow. Building height, shape, bulk, width, orientation, surface treatment and location with respect to other structures can all affect winds and shadows. Generally a reduction in building height above neighboring buildings would result in smaller wind speed increases. "Slabs" at right angles to prevailing winds create the greatest increases in wind speed and turbulence at street level. (Turbulence is greater if there is a low, parallel slab upwind of the higher slab; for example, across the street. In such a situation winds pass over the low slab and form turbulent eddies between the two structures.)[1] Orientation of a "slab" structure so that the long axis would be roughly east to west would be better than north-south orientation in downtown San Francisco, for normal winds. The Redevelopment Agency is committed to require developers of highrise structures to conduct microclimate analysis, including wind-tunnel studies, to determine impacts on pedestrian comfort and to provide a basis for design modifications to mitigate those impacts.[2]

Landscaping is not an effective method of solving turbulence problems, but may be used to create local areas of shelter. To be most effective, vegetation should be dense and should extend from near ground level to at least 15 feet high. While any vegetation absorbs some of the momentum of the air and reduces winds, selection of plant type for wind stamina and appropriate height, and appropriate spacing and orientation

are necessary to maximize the potential mitigating effect. Such measures are properly a part of design review for individual structures and for YBC as a whole. The Redevelopment Agency has retained the architectural firm of Skidmore, Owings and Merrill (SOM) to assist it in such review and to develop landscaping guidelines.

Bus shelters would increase pedestrian comfort by offering protection from wind and rain. Their construction would involve cooperation among the Redevelopment Agency, the Muni, and the Department of Public Works. No plans exist, as far as is known.

MITIGATION OF AIR QUALITY IMPAIRMENT

Construction Emission Mitigation

Reduction of dust generated by excavation and other construction activities may be achieved by using construction-industry-accepted methods of dust control, such as watering. Reclaimed water might be available after 1982 from the proposed Southwest Treatment Plant.[3] Before that time, it might be available from wastewater treatment plants in San Mateo County. CALTRANS is currently using tank-truck-delivered reclaimed water for freeway landscaping irrigation locally.

Chemicals have been used in dust control. They are characterized by their composition (polymer ["plastic"], resin, enzymatic, emulsion, surface-active agent, latex, etc.). Their use has been prohibited on San Francisco wastewater management projects, because of their potential effects on vegetation, contamination of humans and animals, and contamination of groundwater.

Dust generated by spoils-loaded trucks traveling along haul routes could be minimized by watering down load material before trucks depart, covering loaded material, and filling trucks to less than overflowing to reduce the frequency of spills.

No regulations concerning watering or other methods of on-site dust control or private projects are in effect.[4] Standard Specifications, Section 108-17, April 1, 1977, Department of Public Works, apply only to projects under DPW direction (City projects).[5] YBC job descriptions might have such dust-control measures as part of the specifications,[5] particularly during windy weather. BAAPCD Regulation 2 requires that best available methods be used to control dust generation during construction. Measures indicated above would provide such control.

Indoor/Outdoor Mitigation Measures

Protection of the interior of a building (particularly a residential structure) from entry of outdoor pollutants could be achieved by having sealed windows in structures with central air conditioning and recycled air (sealed systems add energy costs because of the replacement of natural with forced ventilation), by keeping the building under slight positive pressure (the incremental pressure would not have to be greater than the normal range of barometric pressure) and by using gas and particulate control devices to prevent the reentry of the building's own heating and cooling emissions.

Specific systems or measures to reduce indoor levels of pollutant exposure that may be required by HUD for residential buildings are:

- Recirculation type ventilation system.
- Central, forced-air heating system with summer-switch for recirculation-type ventilation.
- Electric ranges to be used in lieu of gas ranges, which may emit carbon monoxide and hydrocarbons (however, electric ranges are energy wasters--see Section VI.I.).
- Emission vents of structures to be separated from air intakes.
- Air intakes to buildings to be elevated above street level.
- Avoidance of long linear blocks of structures without breaks (these tend to trap pollutants generated outside). This measure would also reduce local gustiness at street level. Also, arrangement of structures so as to encourage adequate flushing action through movement of prevailing winds.

- o Avoidance of grading that creates low-lying areas, in which pockets of heavier-than-air pollutants (sulfur oxides being the heaviest of the common pollutants) could concentrate. Below-grade plazas also would have this concentrating effect.

The criteria used by HUD in decisions on mitigation requirements are based on Air Pollution Considerations in Residential Planning, Volume I, Manual, July 1974 (Environmental Protection Agency). The quantitative criteria are discussed in Section VI.G. (Air Quality Impacts) of this EIR; they are based on the pollutant levels on the HUD isopleths, as percentages of the applicable standards. Mitigation selection procedures used by HUD locally are discussed in Internal Procedures for HUD Appraiser Use of Air Quality Isopleth Maps, revised August 31, 1977 (HUD San Francisco Area Office). For each combination of: (a) pollutant; (b) pollutant level range; and (c) type of housing (single-family, multi-family), one or more mitigation measures from HUD's mitigation listing are required to be applied.

Mitigation of Growth-Related Air Quality Impacts

Mitigation measures would be required for emissions from both mobile and stationary sources. The first category relates to projected increases in traffic associated with the various alternatives. The second category relates to fuel combustion in the proposed structures.

Mobile Sources. Measures presented in Section VII.F. to reduce traffic volumes and vehicle miles traveled (VMT) would result in fewer emissions and improved YBC-area and regional air quality. Other Section VII.F. measures, emphasizing improved access to parking areas, would minimize spot buildups of carbon monoxide. Transportation mitigation measures and their relation to air-quality mitigation goals are presented in Table 70.

The four alternatives inherently contain, in varying degrees, some of the air-quality mitigation measures suggested in the current (preliminary) Bay Area Air Quality Maintenance Plan (Environmental

TABLE 70

MOBILE SOURCE AIR QUALITY MITIGATION

AIR QUALITY MITIGATION GOAL. REDUCE MOBILE SOURCE EMISSIONS BY:	TRANSPORTATION MITIGATION MEASURES TO FACILITATE MOBILE SOURCE EMISSION REDUCTION*	IMPLEMENTATION
	TRANSIT MEASURES	
1) Reducing long distance and intracity commuting by private automobile.	1) Provide additional capacity for Southern Pacific commuter trains.	- SP - California PUC
	2) Provide additional peak hour capacity on SamTrans bus system.	- SamTrans District - MTC
	3) Increase capacity of the MUNI system in the Market St. corridor.	- MUNI
	4) Increase use of BART on the Transbay line.	- BART - MTC
	INTERSECTION CAPACITY	
2) Reducing idling emissions through the reduction of street and intersection congestion.	1) Lessen congestion at critical intersections through increased use of staggered work hours.	- Voluntary employer/ employee compliance - Support by Redevelopment Agency - Chamber of Commerce - Downtown business associations
	2) Increase use of transit through toll subsidies and transit fast passes.	- Transit agencies - City of San Francisco - Chamber of Commerce - Business associations - Employers
	3) Use van & car pooling to lessen traffic congestion at intersections.	-CALTRANS -City of San Francisco -Golden Gate Transit (pilot project for van pooling)

TABLE 70, Continued

	INTERSECTION CAPACITY, Continued	
	4) Increase use of jitneys as transit activity.	-DPW -Board of Supervisors
	5) Improve flow efficiency through location of driveways for off-street parking.	-DPW -Redevelopment Agency
	PARKING	
3) Controlling parking supply in YBC to encourage use of transit, van and car pools and reduction of private automobile use.	1) Increase use of employee car pools and transit for shopping trips to reduce the need for parking.	-See 2, 3, and 4 in Intersection Capacity
	2) Adjust parking rates to regulate short- and long-term parking.	- San Francisco Parking Authority - Garage owners
	CONSTRUCTION AND OPERATIONS	
4) Minimizing congestion due to construction activities and construction and operational truck traffic.	1) Locate loading areas for truck deliveries to minimize congestion.	-Redevelopment Agenc
	2) Establish truck routes for construction activities.	-DPW -S.F. Police Departm
	3) Provide parking for construction workers to minimize parking congestion and encourage transit use.	-Redevelopment Agenc -Construction Manage

*See Discussion of Transportation Mitigation Measures in Section VII.F.

Management Program, September 1977 [Metropolitan Transportation Commission, BAAPCD, ABAG], Institutional ,Legal and Financial Requirements for Implementing Proposed Air Pollution Control Programs.) These measures are as follows; for each, the order of compliance of the pertinent alternatives is indicated:

Objective A-1: Reduce Long-Distance Auto Commuting (Between Sub-Regional Areas)

"Reduce current long-distance auto commuting and discourage urban development regionwide that results in more auto commuters in more urban areas. Induce more compact urban development in all urbanizing areas of the region through land management techniques. Recognize urban service commitments as incentives for compact development and disincentives for scattered development."

Policy 1: "Restrict the extension of new development to those locations with existing or committed sewer and water service."

All alternatives are equal. Existing sewer and water service covers the entire YBC area, all of which is proposed for redevelopment in each alternative.

Policy 3: "Encourage development of unimproved land within or next to urban areas with existing or committed urban services, relating this to sewer and water service capacities."

All alternatives are equal. YBC is within an urban area with existing urban services and adequate service capacities.

Policy 5: "Encourage 'infill' development of bypassed vacant land within existing urbanized areas."

All alternatives are equal. YBC is bypassed in the sense that it is now primarily an open area surrounded by urbanization. Redevelopment can be considered a form of "infilling".

Policy 6: "Increase housing and job opportunities in existing urbanized areas. Encourage public and private rebuilding into generally compatibly mixed land uses at higher densities."

All four alternatives (redevelopment per se) encourage public and private rebuilding into generally compatibly mixed land uses at higher densities.

Housing: C >B >A >D

All four alternatives provide additional housing in the order shown (Alternative C provides the most; Alternative D provides only the committed housing for the elderly).

Jobs: D >A >B >C

All four alternatives provide additional jobs for the YBC area; Alternative D provides the most, with Alternative A a close second (20% fewer). Alternative C, with two blocks of public park, provides the fewest.

Objective B-1: Reduce The Number Of Auto Trips And Increase Transit Usage

"Reverse the trend of more auto trips and less transit usage. Use land management techniques and service committments as incentives for higher density development. In all new land development regionwide:

--Promote high density development that is supportive of transit usage.

--Discourage low density development that promotes automobile dependency."

Policy 9: "Encourage higher density development in urban areas where existing or committed urban service capacities, including rail transit, can support higher densities."

All the alternatives represent high-density development in an area served by a network of transit lines, including BART and SP (rail transit).

Discouragement of auto dependency: C > B > D > A

The order of the alternatives is in increasing use of the auto. For example, Alternative C, with the largest number of proposed housing units, puts the largest number of people close to work opportunities (within walking or local-transit access), thus reducing dependence on autos.

Use of Transit: D > A > B > C

The order of the alternatives is in decreasing use of transit. This reflects the fact that Alternative D provides the most jobs, with A a close second.

Objective B-2: Reverse The Trend Of More Auto Usage

"Use land management techniques to achieve a better balance of housing, commerce and industry in each urban area."

Policy 12: "Encourage a mixture of residential/commercial/industrial development types in all communities."

C > B > A > D

All four alternatives contain a mix of residential, commercial (including office and retail commercial) and light industrial uses. Alternative C, with the largest number of housing units, contains the most-even mix of uses; it reflects, more than the others, the concept of a return of residents to the central city. Alternative D, at the other end of the scale, maximizes the amount of conventional commercial uses (office plus downtown support) and reduces additional housing to the committed uses.

Policy 13: "Discourage new large-scale land development projects that are exclusively commercial, industrial or residential."

C > B > A > D

None of the alternatives would produce only one type of land use; however, the emphases are illustrated in the discussion under Policy 12 above. Alternatives B and A would be intermediate in the sense that the recreation/entertainment park and the convention center are not conventional downtown commercial uses, and that the amounts of conventional commercial space in these are intermediate between those of Alternatives C and D.

Stationary Sources. Although no major stationary sources (as defined and listed by BAAPCD--Emissions Inventory Summary Report, pp. 19-26, August 18, 1976) exist in the YBC area at present, all alternatives (and particularly Alternative D) provide for additional light industry at full development. BAAPCD, the local agency responsible for enforcement of stationary source emission regulations,would have to be approached for permits for major stationary sources, per BAAPCD Regulation 2, Section 1309. That Section establishes District authority to determine the significance of emissions of stationary sources. BAAPCD Memorandum, May 10, 1976, establishes emission limits requiring no review. Notification of BAAPCD early in the planning and design of specific point sources would ensure the most straighforward compliance with applicable emission control regulations. This early notification could be part of the Redevelopment Agency's Design Review process.

In general, mitigation of air pollution impacts associated with stationary-source fuel combustion would require the resource use (energy) mitigation measures of Section VII.I, coupled with the use of cleaner fuels (in the sense of low-sulfur content and low solids content--it is the switchover from natural gas to fuel oil that creates the potential for increased air pollution) and emission controls. The latter two would most likely come from current and future Environmental Protection Agency/Air

Resources Board/BAAPCD regulations about fuel selection (and clean-up of fuels at their source) and about emission controls on combustion equipment (boilers).

FOOTNOTES

[1]San Francisco Planning and Urban Renewal Association (SPUR), 1975, Impact of Intensive High Rise Development on San Francisco, Summary and Detailed Findings.

[2]T. Conrad, Chief, Planning, Housing and Programming, Redevelopment Agency, telephone conversation, November 30, 1977.

[3]D. Birrer, Bureau of Sanitary Engineering, Department of Public Works, telephone conversation, December 1, 1977.

[4]M. Choy, Building Inspector, Bureau of Building Inspection, telephone conversation, November 30, 1977.

[5]T. A. Kaden, Engineer, Department of Public Works, telephone conversation, November 30, 1977.

H. NOISE

1. MITIGATION OF NOISE LEVELS ALONG HAUL ROUTES

As discussed in Section VI. H, page 393, there would be a perceptible increase in the L_{10} noise level along haul routes used by construction truck traffic during the excavation for the convention center. This impact is mitigated by restriction of truck traffic to the 9 a.m. - 4 p.m. period (Department of Public Works restrictions). The most effective techniques available for mitigating construction truck traffic noise would be to require that all trucks be properly muffled and maintained and to develop haul routes that avoid residential areas as much as possible. Both measures would be the responsibility of the convention center construction management (CM) firm, under the control of the Redevelopment Agency, which is committed to these measures for all YBC projects.[1]

2. MITIGATION OF CONSTRUCTION NOISE LEVELS

The San Francisco Noise Ordinance (See Appendix H) requires that powered construction equipment, other than impact tools and equipment, regardless of age or date of acquisition, emit no more than 80 dBA when measured at a distance of 100 feet, or an equivalent sound level at some other convenient distance. (Sound power from a point source, such as a piece of construction equipment, drops off in inverse proportion to the square of the distance to the receptor. That is, doubling of the distance drops the sound power to one-quarter of that at the original distance. This is equivalent to a drop of 6 dBA for a doubling of distance from the source. At a distance of 3.16 times the original, sound power drops to one-tenth the original; this is a 10 dBA drop in noise level. Thus 80 dBA at 100 feet is equivalent to 70 dBA at 316 feet, for the same source.) Impact tools and equipment, including pavement breakers and jackhammers, must have intake and exhaust mufflers recommended by the manufacturers and approved by the Director of Public Works as best accomplishing maximum noise attenuation. Meeting these limits would still result in perceptible noise in specific instances: for example, where existing housing abuts construction sites.

The City of San Francisco has adopted additional construction noise limits for its Wastewater Management (WWM) Program. The WWM program includes sites with a range of ambient noise conditions that includes those in YBC. The limits contained in the special provisions and standard stipulations for this program which are applicable to housing are:

- o for steady-state noise from 7 a.m. to 7 p.m., construction noise not to exceed 60 dBA at the building facade of a high-density residential building.

- o for intermittent, impulse (pulse-type) or impact noises during the same time period, construction noise not to exceed 65 dBA at the building facade.

Adoption of a specification such as this by the Redevelopment Agency would result in minimal construction noise impact. The Redevelopment Agency is aware of the WWM program construction noise limits but has not yet agreed to adopt such mitigation measures (T. Conrad, Chief Planner, SFRA, telephone conversation, September 15, 1977). Meeting limits such as these would require additional measures: the safety barriers that are erected around construction sites would need to be made airtight, with a minimum surface density of four pounds per square foot, so that they would also function as noise barriers. Quasi-stationary equipment (portable air compressors, etc.) would need to be shielded.

The most positive way to reduce construction noise impact at night during the construction phase of a YBC project would be to limit the hours during which construction could take place. Restricting the hours of construction to 7 a.m. - 6 p.m., for example, would insure that there would be no interference with sleep during nighttime hours. The San Francisco noise ordinance requires a special permit for construction between 8 p.m. and 7 a.m. As far as is known, there is no general Redevelopment Agency policy on nighttime construction. Planned construction hours for the convention center are 8 a.m. through 4:30 p.m.

3. MITIGATION OF POST-CONSTRUCTION NOISE LEVELS

Potential noise mitigation measures fall into the categories of site planning and building design. Site planning refers to placing a proposed development on a site so that maximum advantage is taken of acoustical isolation for both interior and exterior spaces. Mitigation measures relating to building design apply primarily to reducing exterior noise to acceptable interior levels. For the proposed residential development in the four alternatives, HUD requirements for noise mitigation (HUD Circular 1390.2) and the California noise insulation standards would be the primary enforcement tools with respect to both categories of mitigation measures. See Appendix H for details on these controls. Current plans for housing noise mitigation appear at the end of this section.

Examples of site planning for noise control that could be used are:

- Setting back housing from the major streets. The area between the housing and the street could then be used for less-sensitive commercial development or for landscaping. The former could affect livability; the latter would add costs.

- Orient housing away from the noise source, with courtyard and balcony areas screened from the noise by the building.

Although site planning can reduce and even eliminate the need for further noise reduction by building design, often some special requirements are needed to insure that acceptable (according to HUD and California standards) interior noise levels are achieved. The degree of noise reduction required is dependent on the exterior noise level. For example, noise exposure along both Mission and Howard Sts. is the highest in the Redevelopment Area. In order to meet the California noise insulation standard (see Appendix H) of 45 CNEL for interior noise in multi-family housing built right to the property line on these streets, a noise reduction of about 30 dBA would be required. Buildings at the property line along other major streets would require about 5 dBA less noise reduction.

An outdoor to indoor noise reduction of 25-30 dBA would require that all windows be acoustically gasketed (they can still be openable -- acoustical gasketing serves the same functions as standard weatherstripping; also, it provides additional noise shielding). The California noise insulation standards require that, if windows must be closed to achieve an interior level of 45 CNEL, then the means of providing ventilation must be specified. It is possible in some cases, especially for higher floors, to meet the interior standard without requiring closed windows. Window boxes or other barriers which can obstruct line-of-sight to the noise source could achieve the required reduction if designed by an acoustical engineer.

Of the four proposed housing projects anticipated by 1980, two have sponsors (TODCO) and are in the process of design.[2] Of these two only the project on the southwest corner of Fourth and Howard Sts. would be in an area where the 24-hour L_{33} exceeds 65 dBA (HUD criterion). This project, as proposed, would include the following mitigation measures:

- o An outdoor recreation area would be included in the project; it would be shielded from Howard St. by the building and from Fourth St. by a six-foot high fence. This area would also be set back a distance of 80 feet from Fourth St., with the intervening space occupied by a community vegetable garden.

- o The exterior balconies of the housing units that face Howard St. and Fourth St. would be shielded by a solid railing three feet high. The undersides of the balconies would be treated with a sound-absorbing material to reduce reflected noise.

- o Windows and other penetrations would be located and oriented to minimize interior noise levels.

The noise mitigation measures that would ultimately be implemented for other housing in the area would depend upon the individual developers and their designers; the interior and exterior noise environment would have to meet the HUD requirements and the California noise standards,

against which the above measures were designed. It is premature to suggest particular measures (such as those above, plus non-openable windows) prior to final design.

FOOTNOTES

[1]Ms. Z. MacDonald, San Francisco Redevelopment Agency, telephone conversation, November 30, 1977.

[2]Ms. Z. MacDonald, San Francisco Redevelopment Agency, telephone conversation, September 15, 1977.

I. RESOURCE USE

1. ENERGY

In considering potential YBC energy mitigation measures, it is helpful to review energy consumption by use to focus on the most relevant approaches. Vehicular energy use would constitute 60% or more of the total energy use for each alternative. The non-vehicular energy use is summarized in Table 66 (Section VI.I, page 422). It is clear that electricity for office buildings is the largest single non-vehicular use component in each alternative.

Energy consumption estimates for all buildings were based on the energy use standards for new construction, as specified by the California Energy Resources Conservation and Development Commission,[1] which impose maximum annual (at source) energy use per square foot of floor area. Since these standards define the level of impact, the mitigation measures to be discussed herein should be considered as a means of not just meeting the standards, but of going beyond them in energy conservation.

Finally, it should be realized that energy conservation designs for large buildings are complex engineering problems which must determine the net effectiveness of proposed energy conservation features and their life-cycle costs. These analyses consider the interaction of various energy conservation features and attempts to optimize energy conservation. In addition, they include economic factors, such as increasing fuel costs and a sensitivity analysis for uncertain future costs, in order to provide a basis for judging the cost effectiveness of alternative systems.

Transportation

Transportation energy conservation strategies aim toward reduction of vehicle miles traveled per person for occupants and workers of the project. Car-pools, van-pools and small cars can provide energy consumption savings over commuter use of single, two-occupant, or larger

automobiles. The Redevelopment Agency could require the reservation of a number of parking spaces for van-pools, car-pools and small cars to encourage use of vehicle-pools and small cars.

Public transit can provide energy consumption savings over the use of automobiles. The Redevelopment Agency could require the provision of passenger shelters at bus stops to encourage the use of public transit.

Building Operation

Use of lighting levels in excess of that needed for the tasks being performed, use of electric light when adequate natural light is available, inadequate maintenance of automatic lighting systems, lighting of unused areas or of work areas when workers are not present, scheduling building cleaning and maintenance during the night, thermostat settings in excess of 68° Fahrenheit for the heating system and less than 80° for the air-conditioning system, and failure to maintain heating and cooling systems are all examples of operational methods which waste energy. The Redevelopment Agency intends to encourage the establishment of employee/ occupant education and regular equipment maintenance programs to help reduce such waste.[2]

Building Design Features

Within the minimum limitations imposed by the State energy conservation standards, discretionary design features could be incorporated to improve operational efficiency. Additionally, the Redevelopment Agency intends to encourage building systems design which would be of greater efficiency than demanded by the State standards.[2] Design features which could result in such increases include:

Building Envelope. Placing insulation outside of the structural wall to increase the thermal mass of the structure. Window placement and shading can be designed to reduce warm-weather solar heat gain by blocking out the summer sun, and to maximize the available natural light within the structure.

Lighting. Providing wiring to permit local control of lights especially in places where natural light is available. Providing lighting levels appropriate to the task to be performed (general office lighting can be less than two watts per sq.ft.). Using fluorescent lights wherever appropriate to the task. Using water-cooled lights to aid in waste-heat recovery/exhaust (these systems are generally closed to minimize water consumption). Eliminating decorative lighting. Using high pressure sodium lights for exterior lighting. Providing exterior light at the minimum level necessary for public-health and safety. Shielding exterior lights to shine only in the area needed. Equipping exterior lights with devices to prevent daytime operation.

Heating, Ventilation and Air Conditioning (HVAC). Reducing ventilation to the minimum required. Using waste heat, such as from water-cooled lights, to minimize heating requirements. Providing control systems and building heating and cooling zones to facilitate conservation in operation. Selecting the minimum size of equipment needed to perform the required functions. Energy use for parking structures can be minimized by open above-ground structures to eliminate ventilation needs and reduce lighting needs. Aesthetic considerations would become important for such structures.

Renewable Resource Use. Using solar energy to supply space heating and water heating in the structures. Both active and passive solar energy collection systems can be utilized. Solar energy may be able to provide large portions of the heating energy needed for buildings with a large surface-to-volume ratio (i.e., small single and two-story structures or tall slender structures). Solar energy may also be able to supply domestic water heating needs for buildings with a small surface-to-volume ratio (i.e., large high-rise structures); however, the waste heat from lighting and people in such buildings means that the main energy use is associated with cooling requirements. In the latter case, solar energy may be able to help supply the cooling energy requirement by the use of absorption chillers.

Industrial processes. Using waste heat from industrial processes to help meet the needs of industrial structures. Industrial equipment which is sized correctly for the task would also conserve energy.

Total Energy System for Buildings

Another means of energy conservation for large buildings (such as office and commercial buildings and the convention center) is the total energy system. The Redevelopment Agency intends to encourage the use of this type of system in general in new structures.[2] (The designers of the convention center are not now considering such a system.) This type of system uses on-site generation of all electricity for non-cooling electric loads (lighting, elevators, fans, etc.), absorption type chillers for cooling, and oil- or gas-fired boilers for heating. Energy rejected from the electric generators is used to reduce the fuel otherwise required for heating and cooling. Absorption chillers use heat directly to produce chilled water, in contrast with electric chillers which use a mechanical refrigeration cycle.

Analyses of such total energy systems have concluded that the net potential energy savings are complex functions of the relative noncooling electric load, the heating load and the cooling load for the specific structure.[3] These relative loads are related to design, use and climatic location of the building. Energy savings at source of 10-20% are shown to be obtainable over energy supplied by an electric utility, depending on the variables discussed above.

A total energy system has a higher initial cost than a conventional HVAC system; however, savings in annual operating costs (no purchase of electricity) should pay for the incremental investment over the life of the system, which would depend upon which system is selected.

A life cycle analysis[4] of a one-million square foot hospital proposed for the Bay Area indicated a 43% energy saving (at source) and a 15% cost advantage for a total energy system using a diesel generator could be achieved.

Solar energy can be integrated into total energy systems in a variety of possible applications.

Implementation of a total energy system could be accomplished for individual larger buildings proposed within YBC; however, it may well be that maximum energy conservation and life-cycle costs would require a more complex arrangement, where electric generators for one large structure would supply electricity to adjacent smaller structures or where several large structures would share a common total energy system. Such power-sharing arrangements are not now common practice and may require permissive policy decisions from a number of regulatory agencies.

An alternative means of arranging a total energy system for YBC buildings is to encourage Pacific Gas and Electric Company to provide an appropriately-sized electric generating plant adjacent to the site to supply both electricity and waste heat. This approach would introduce a single, and potentially better regulated, air pollution point source rather than several smaller point sources. PG&E would review specific proposals for such systems as they were proposed.[5]

2. WATER

All Alternatives

- The Redevelopment Agency intends to require the use of low-flow toilets, urinals, taps, and showerheads to reduce water consumption.[2]

- The Redevelopment Agency has agreed to use a water-efficient form of irrigation, such as drip irrigation, and drought-resistant landscape materials in the park area to reduce irrigation.[2]

- After the convention center is completed, the dewatering pump installed to prevent the rise of the water table above -2 feet could be used to pump water for landscape irrigation.

Implementation of this provision would be dependent on the quality of the water and the ability of the structure to withstand changes in the level of the water table. It is under consideration by the convention center engineers.[6]

- Dewatering waste water from the convention center site could be used by the Bureau of Street Cleaning to water street trees; the Department of Public Works currently owns tank trucks which carry dewatering wastes for this purpose. Use of this water would depend on the needs of the Tree Division at the time of construction.[7]

FOOTNOTES

[1]ERCDC, 1977, Regulations Establishing Standards for New Non-residential Buildings, Energy Resources Conservation and Development Commission, Sacramento. ERCDC, 1977, Residential Building Standards, Energy Resources Conservation and Development Commission, Sacramento.

[2]T. Conrad, Chief Planner, San Francisco Redevelopment Agency, telephone communications, September 2, 1977, November 15, 1977, and December 8 and 9, 1977.

[3]Salter, R.G., R.L.Petruschell, and K.A. Wolf, 1976, Energy Conservation In Nonresidential Buildings, R-1623-NSF, Rand Corporation (National Science Foundation).

[4]Goldstein, D.B. and A.H. Rosenfel, 1975, Conservation and Peak Power--Cost and Demand, LBL-4438, Lawrence Berkeley Laboratory (U.S. Energy Research and Development Administration).

[5]R. McKillican, Industrial Power Engineer, San Francisco Division, PG&E, telephone communication, August 8, 1977.

[6]W. Takahashi, Engineer, Hayakawa Associates, telephone communication, September 2, 1977.

[7]D. Martin, Department of Public Works, telephone communication, November 18, 1977.

J. GEOLOGY - SEISMOLOGY

The mitigation measures described below would apply to each of the alternatives.

- Buildings would be designed in conformance with the San Francisco Building Code, Article 23, Sections 2314A to K, to withstand damage resulting from the ground motions which might occur during the maximum probable earthquake. For buildings which are six stories and higher, the anticipated interaction between the site and the structural frame during a major earthquake must be considered in the design. The San Francisco Bureau of Building Inspection requires that building designs meet these criteria.

- To insure adequate foundation support for proposed new structures, a licensed soils engineer would be retained to investigate the site and prepare recommendations based on current soils engineering practice as required by the Seismic Safety Element of the San Francisco Comprehensive Plan. The required soils studies for the convention center are now in progress. All buildings would be designed in accordance with the soils engineer's recommendations.

- Periodic checks of structures in and adjacent to the site could be conducted by the San Francisco Bureau of Building Inspection to determine if settlement were occurring in areas subject to potential subsidence and to differential settlement. Building inspection is conducted ordinarily only after a complaint has been filed with the Bureau of Building Inspection.[1]

- All buildings would be designed and positioned in conformity with the policies of the San Francisco Community Safety Plan. Highrise buildings would be designed or positioned to minimize the fall of debris and glass onto sidewalks, streets or other

areas where people are likely to gather. New office towers would be set back from the street above the second story of the structure.

- o SB-3 would be given consideration in Alternatives A and D for use as a housing or office building site because it is a bedrock area and possesses the least seismic safety hazard. These uses are included in Alternatives B and C. The San Francisco Redevelopment Agency has indicated its intention to take this mitigation measure into consideration in its planning for the site.

- o Erodible, unconsolidated geologic materials exposed during construction would be protected from wind erosion. Clays and silt might be a source of dust in the area; this is also treated in section VII. G of this EIR. The ground surface could be wetted down with reclaimed water.

The following mitigation measures refer to construction of the convention center.

- o Excavation pit walls would be shored up and protected from slumping or lateral movement of earth materials into the pit. Dewatering would be done to prevent liquefaction and flooding in the pit. The contractor would comply with the Excavation Standards of the California Occupational Safety and Health Agency (Department of Industrial Relations). The construction contractor, Turner Construction Company, plans to use shoring and sheeting with "soldier beams" for this purpose.[2]

- o The excavation pit would be surrounded by a single fence as a safety measure as required by the San Francisco Building Code. The construction contractor has indicated his intention to fence off the construction site and to use a shoring technique which would minimize the possibility of collapse of the pit wall.[2]

- The tires of haul trucks would be cleaned off as the vehicles were leaving the excavation site. Such cleaning would prevent muddying of the streets near the site, which condition creates a safety hazard, a source of dust, and an unsightly appearance. Turner Construction Company has indicated its intention of requiring the excavation contractor to keep city streets clean on a daily basis.[2] A washing station on the site may be required.

FOOTNOTES

[1]B. Fischer, Plan Check Engineer, San Francisco Bureau of Building Inspection, telephone communication, December 8, 1977.

[2]R. Dorais, Turner Construction Company, telephone communication, December 8, 1977.

K. HYDROLOGY

The mitigation measures described apply to all of the alternatives.

- Install groundwater observation wells for monitoring the level of the water table and other instruments to monitor settlement and subsidence in the area as recommended by the City's soil engineering consultants in their report to the City of October 13, 1972. The construction contractor for the convention center would place observation wells on the perimeter of the convention center site. Some wells could be maintained after construction of the convention center is completed; however Turner Construction Company has indicated that it does not intend to maintain the wells.[1]

- If in the judgment of City engineers unacceptable subsidence occurs during the construction, initiate groundwater recharge to halt the settlement.

- SB-3 would be given consideration in Alternatives A and D for use as a housing site (it is planned for housing in Alternatives B and C) because it is topographically higher than other areas in YBC and less subject to flooding. The San Francisco Redevelopment Agency has indicated that it would take this mitigation measure into consideration in its planning for the site.

- HUD requirements for housing are as follows:[2] The combination of the storm drain system, the street cross-section and the protective slope around the buildings would render the finished grade of the buildings free of stormwater overflows. In storms up to the magnitude of the 10-year storm, runoff would not be permitted to overflow the curbs; in the 50- and 100-year storms, runoff would not be permitted to overflow the finished grade of housing. Raw-sewage overflows during storms would not be permitted. Mitigation of the above

hazards would require a change in the stormwater drainage system or in the storm drain-sewer design criteria. Possible mitigation alternatives recommended by H.U.D. include:

1. Separate the storm drain and sewage systems in the YBC area. If the sewer lines were cut-into above the site, the sewage could be channeled to other parts of the system. A parallel line could be constructed to carry sewage from buildings in the area. A pressure pump might be needed to move the sewage out of the area. Stormwater overflow in the street would thereby create a smaller health hazard.[3]

2. Develop a self-contained pressure system to handle storm water runoff and prevent sewage overflows. Construct storage facilities for temporarily holding storm water in the YBC area.[4]

The Department of Public Works has indicated that the HUD recommendations are unacceptable. It would be impractical to implement the mitigations because the drainage into YBC comes from such an extensive area. DPW believes that the health hazard question is hypothetical because there is no history of health problems resulting from sewage overflows in the YBC area and because the dilution of sewage would be so great in large storms when overflows would occur. Either mitigation measure would be expensive and create a financial burden which the City would find difficult to bear at present and which would produce doubtful benefits.[5]

- Groundwater pumped from the site could be used in construction of the convention center and for washing off haul truck tires. The contractor does not intend to use groundwater from the site for these purposes, but rather would use water from the City water system.[1]

- Groundwater pumped from the site would be filtered, if this is found necessary, to prevent sediment from entering the storm-drain-sewer lines. The contractor has indicated his intention of requiring the dewatering contractor to comply with the directives of the Department of Public Works in handling sediment in the groundwater.[1]

FOOTNOTES

[1]R. Dorais, Turner Construction Company, telephone communication, December 9, 1977.

[2]HUD Handbook, Storm Drainage Design, 4140.1, Chapter 7.

[3]H. Blaser, Regional Civil Engineer, HUD, Sacramento, Ca., telephone communication, December 9, 1977.

[4]H. Blaser, Regional Civil Engineer, HUD, Sacramento, Ca., telephone communication, August 26, 1977.

[5]D. Birrer, Senior Civil Engineer, Bureau of Sanitary Engineering, San Francisco Department of Public Works, telephone communication, December 13, 1977.

L. ECOLOGY

ALTERNATIVE A

- The Redevelopment Agency would use vegetation native to Northern California for landscaping trees, shrubs, and herbs (as they are available)[1] to reduce the need for irrigation and increase the potential habitat for native birds as opposed to non-natives such as the domestic pigeon and the English sparrow.

ALTERNATIVE B

- Same as Alternative A, above.

ALTERNATIVE C

- Same as Alternative A, above, plus:

- The Redevelopment Agency intends to seal off unneeded sewer laterals prior to placement of fill soil for park development, to reduce the rat population.[1]

FOOTNOTES

[1]T. Conrad, Chief Planner, San Francisco Redevelopment Agency, telephone communication, December 5, 1977.

M. ARCHAEOLOGIC AND HISTORIC ASPECTS

1. ARCHAEOLOGIC.

Since there is a possibility of encountering materials from the prehistoric period and a probability of encountering artifactual remains from the Gold Rush period as well as the late nineteenth and early twentieth centuries, a program of pre-construction archaeological testing is under consideration to determine the potential for cultural resources from various chronological periods within the convention center block. The testing could supplement the archival research which has been done (Olmsted, R., N. Olmsted, and A. Pastron, 1977, Yerba Buena Convention Center, Report on Historical Cultural Resources, on file at the Office of Environmental Review, Department of City Planning). The testing would be done on two sites where the earliest buildings of the 1850's were built, and would consist of trenching. Test borings would also be made at other identified potential sites.

In addition, a systematic program of monitoring of construction activities would be carried out under the direction of a principal investigator who would be a competent archaeologist with expertise in prehistoric and historic archaeology. The construction engineer and construction crew chiefs would be instructed as to the nature of artifacts that might be encountered and advised that the collection, identification, and storage of such artifacts must be done by a suitable public agency.

Dependent upon the findings and experience gained in the convention center block, the first where new construction is expected and appropriate excavation and monitoring measures taken, archival studies may be made for other portions of YBC. The archaeologic consultants (Olmsted, et al., op. cit.) have indicated that further studies would be appropriate in the event that artifacts contributing to an understanding of historic events not already documented were found.

2. HISTORIC

The disposition agreements and owner participation agreements entered into by the Redevelopment Agency would assure that each of the four buildings identified as having unique architectural interest would be improved, enhanced and maintained as attractive architectural representations of the varied styles of past eras which they represent.

VIII. UNAVOIDABLE SIGNIFICANT ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED IF ONE OF THE ALTERNATIVES IS IMPLEMENTED

In this section, the alternatives will be cited in order of diminishing impact, wherever they are mentioned. Impacts are for full development (1988), unless noted otherwise. In general, the impacts of the Redevelopment Agency November 1977 tentative proposal are those of Alternatives A or B or fall between those of the two. The term "discretionary" refers to proposed uses that are not yet firmly committed. Such uses define the differences among the alternatives.

Land Use and Social Characteristics: If Alternatives D, A or B are implemented, there would be an extension of the Retail and Financial Districts into the YBC area, with an additional (discretionary) 9.5 million, 7 million and 3 million sq.ft. of office plus retail plus downtown-support space, respectively. Alternatives D or A would probably result in an insufficient total number of housing units (1,136 and 1,186, respectively) to support a variety of neighborhood commercial services. The housing impacts of the Redevelopment Agency tentative proposal would be more like those of Alternative B than those of any other alternative. In Alternatives A or D, there would be a relatively incompatible juxtaposition of housing and industry, whereas in Alternatives B and C the industrial sites which abut housing in A and D would be occupied by housing. With Alternatives B or A, YBC would become a day-and-night activity center, as B and A would both have the convention center and B would have the recreation/entertainment park also. Pedestrian amenities would be provided in a concourse and/or park in Alternatives C, A, or B; C would have a two-block public park plus a concourse in a third block, while D would have no public open space.

Visual Aspects: Public and private art and embellishment would be provided in Alternatives A, B or C (statute and Redevelopment Agency policy). The amounts provided would be proportional to developed value of construction. Views of historic buildings would occur with Alternatives C, B or A. With the maximum open space, C would provide the longest and widest fields of view.

Housing: In Alternatives C, B or A, former substandard, overcrowded housing would be replaced with standard housing, both subsidized and market-rate; the discretionary and committed additions are 1,902, 1,552 and 652 units, respectively. In Alternative D, only subsidized elderly housing (602 units) would be added. In Alternatives C, B, A or D the extant shortage of low- and moderate-income housing would be reduced; discretionary and committed additions are 902, 902, 602 and 602 units, respectively.

Economics: Alternatives D, A, B or C would totally or partially meet the anticipated San Francisco demand for new office, retail and downtown-support space, with an additional discretionary 9.5 million, 7 million, 3 million and 1 million sq.ft., respectively. In Alternatives B or A, with the convention center and/or the recreation/entertainment park, a new activity center for tourism would complement and compete with other such centers in the City. An increase in employment opportunities would be created by Alternatives D, A, B or C, with job additions of 35,000 , 29,000 , 14,000 and 6,000 respectively. There would be a need to provide: (1) the local one-third share of redevelopment costs (a condition of the existing HUD loan) in Alternatives A, B, C or D ($27 million, $26 million, $26 million, and $25 million, respectively; and (2) public agency improvement costs to complete development (including the convention center in Alternatives A and B) in Alternatives B, A, C or D ($114 million, $113 million, $34 million and $2 million, respectively). San Francisco general-fund obligations would be highest in Alternative C, because of the two-block public park, with acquisition and improvement costs totaling $24.5 million. There would be a requirement for general obligation bonds in Alternative C. There could be a Redevelopment Agency funding surplus (after costs) in Alternatives C, B, A or D. The actual amounts

depend on the estimated land sales proceeds. Maintenance costs for public areas would be required in Alternatives C, A or B (annually $550,000 , $170,000 and $88,000, respectively). An increase in taxable value would accrue from Alternatives D, A, B or C (assessed valuation would be $128 million, $109 million, $56 million, and $34 million, respectively).

Community Services: In Alternatives D, A, B or C (D highest, C lowest) there would be an additional flow of sewage to treatment plants and an additional contribution to overflows into the Bay until completion of the City's wastewater management system. Solid wastes produced in Alternatives D, A, B or C would contribute to shortening the life of the existing disposal site. Demands for police protection would probably be in the (decreasing) order: D, A, B, C, based on proposed developed floor space of the various uses. Required Police Department surveillance of public open spaces would be in the (decreasing) order: C, A, B, based on acreage devoted to public parks, concourses, etc. (D has none). In Alternatives A and B there could be a fire threat to users of the convention center, because of the large numbers of people in the underground exhibit hall at one time.

Transportation: With respect to pedestrian flows, there would be congestion on the concourse and sidewalks during peak traffic hours in Alternatives A, B, D or C, and congestion after special convention center and/or recreation/entertainment park events in Alternatives B or A. Certain transit routes would be approaching or over capacity during the p.m. peak two hours in Alternatives A, D, B or C. Most local transit routes would probably be over capacity during the p.m. peak 15 or 30 minute periods. With Alternatives B or A, there would be sidewalk blockage by users awaiting transit after special convention center and/or recreation/entertainment park events. In 1988, under Alternatives A, D, B or C, there would be p.m. peak hour congestion at seven of the YBC intersections; at Fourth and Market Sts. and at Third and Mission Sts., Level of Service would be "F" (several signal cycles required for an individual vehicle to clear an intersection). With Alternatives A, D or B, there would be a deficiency in public plus private parking spaces within YBC to meet YBC-generated demand. This deficiency would be

compounded by the existing (continuing) demand from out-of-YBC land uses, which comes primarily from commuters to offices and businesses outside of YBC, who now park in the temporary YBC lots.

Climate and Air Quality: With Alternatives A, B, D or C, local wind turbulence and shadowing effects would be produced by highrise buildings, leading to reduced comfort in open spaces and on streets. Dust would be produced by excavation and construction activities in Alternatives A, D, B or C; its main effect would be discomfort to pedestrians. Under Alternatives A, D, B or C, generated traffic after development would produce carbon monoxide (CO), an air pollutant affecting the health of people in the vicinity. With Alternatives A, D, B or C (A and D roughly equal), generated traffic and building heating systems would produce sulfur oxides (SO_x), nitrogen oxides (NO_x), and suspended particulates (SP), all air pollutants affecting health and/or contributing to oxidant (smog) formation. Housing proposed under Alternatives A, D, B or C would be exposed to CO from vehicles on the James Lick Freeway under stagnant air conditions or with light winds from the south-southwest or the east-northeast.

Noise: With Alternatives A, D, B or C, there would be a doubling to tripling of perceived noise levels along haul routes used by trucks transporting excavation spoils (Third, Fourth, Folsom and Howard Sts.). Pulse-type construction noise (riveting, pounding) under Alternatives D, A, B or C would produce a startle reaction in residents of housing, when construction occurs on adjacent lots. Existing and future traffic noise on YBC streets under Alternatives C, B, A or D would place constraints on proposed housing. The ranking is in diminishing order of the number of proposed new housing units; additional traffic noise generated by proposed YBC development would be barely perceptible compared to existing and projected noise levels, mostly from non-YBC-generated traffic in the area.

Resource Use: Vehicle trips generated by Alternatives A, D, B or C would consume dwindling supplies of gasoline and diesel fuel. Proposed buildings would consume electricity (D, A, B, C), natural gas (C, D, B, A) and fuel oil (A, D, B, C). Total energy consumption after

development would be in the (diminishing) order: D, A, B, C. Construction (not including excavation) would consume an amount of energy equivalent to that used in three to five years of future operation (Alternatives D, A, B or C). Alternatives D, A, B or C would consume water.

Geology/Seismology: Earthquake hazard, proportional to the number of people in YBC at a given time, would occur under Alternatives D, A, B or C (daytime) and under Alternatives C, B, A or D (nighttime--overnight).

Hydrology: In storms of intensity greater than that of the five-year storm, raw sewage could flow in YBC streets, under Alternatives D, A, B or C.

IX. SHORT-TERM vs. LONG-TERM IMPLICATIONS

In the redevelopment context, the only short-term effects are those of the construction process; the long-term effects are those associated with operations following development. The long-term objectives of redevelopment in YBC, as elsewhere, are: (1) the removal of blight and of substandard buildings and living conditions; (2) the replacement of under-used space or empty unused urban open space with higher-density development or usable open space; and (3) the provision of housing and jobs, and general economic improvement (revitalization of the downtown area).

The first objective has, for the most part, been achieved in YBC. The second and third objectives have been partially realized.

The cumulative and long-term effects of the alternatives which would affect the environment include the anticipated increase in automobile trips caused by the development of the YBC area, leading to an increase in congestion and fuel consumption, resulting in impacts on air quality.

Another long-term impact on air quality comes from the proposed construction of a concentration of buildings, each of a size large enough that it would be required to burn fuel oil rather than natural gas. This would produce local levels of oxides of sulfur (SO_x) that would exceed standards by factors of up to about 6.5. (As natural gas supplies dwindle, this effect would become common in all downtown areas -- San Francisco projections for the BAAPCD monitoring station at 939 Ellis St., west of Van Ness Avenue, are for increases in levels of SO_x and more-frequent violations of pertinent air quality standards.)

There would be an increased demand for fuel oil, natural gas, and electricity, which would consume dwindling supplies of basic energy sources. The increased demand for water could tax supplies in drought years.

The extent of the long-term effects would vary among the alternatives (See Sections VI and VIII).

X. IRREVERSIBLE ENVIRONMENTAL CHANGES

Land in YBC would again be committed to urban uses, requiring a range of urban services. Alternatives A and D would result in an expansion of the downtown core; Alternative B would create a more-intensive daytime and nighttime activity center. Alternative C would maximize public open space (while this is not physically irreversible, politically it would be difficult for a public park, once developed, to revert to private use); it would also maximize residential uses. Proposed phasing of all alternatives is such that proposed plans are subject to change during the course of development. Land use variants analyzed as part of each alternative contribute to this flexibility. The mix of development would depend on market conditions over the ten year (or longer) period analyzed. In that sense, adoption of a revised redevelopment plan does not lead to totally irreversible environmental changes.

Non-renewable resources used would include the land, presently under-developed and in an urban location, and the energy and materials (some of which are potentially recyclable) used in the construction of future developments on the site.

Demolition of remaining substandard structures, including the Planter's Hotel at Second and Folsom Sts., the Imperial Hotel and the adjacent building on Fourth St., and the buildings on the east side of Third St., north and south of the Mission St. intersection, including the Jessie Hotel, would be irreversible.

XI. THE GROWTH INDUCING IMPACT OF THE ANALYZED ALTERNATIVES

Redevelopment of the magnitude proposed for YBC creates growth of uses within the redevelopment area boundaries. The assembly of impacts of that direct growth, and the mitigation measures therefor, are the primary subjects of this EIR. The unavoidable significant direct effects are summarized in Section VIII.; mitigation measures appear in Section VII. Some of the direct effects are repeated in the following paragraph.

Alternatives D and A, to a lesser extent Alternative B, and to a still lesser extent Alternative C, would cause a growth in the number of commuters living outside the City but attracted to jobs in YBC. Conversely, Alternative C, and Alternative B to a lesser extent, would produce an increase in residential population in downtown San Francisco. Alternative A and more especially Alternative B would enhance the importance and function of the YBC area as a regional center, drawing and attracting people to it from the Bay Area and Northern California. Increased office plus retail plus downtown-support uses (D greater than A greater than B greater than C) would induce a demand for a growth in transportation facilities required to serve them and for an increase in the supply of housing in YBC, San Francisco and the region; would increase local expenditures by workers; and would induce a growth in the commercial and public services required.

The amount of indirect growth induced by the YBC alternatives depends on how much of the YBC growth is due to movement into YBC of uses now existing in San Francisco and the region. Indirect growth refers to the jobs (public and private sectors) that would be created to provide the goods and services needed by the new employees in YBC. As pointed out on page 252, a multiplier of 2.4 applied to the new direct jobs in each alternative (Table 34, page 255) might give a reasonable indication

of the number of additional (indirect) jobs in the Bay Area induced by potential YBC development. On that basis, the induced (indirect) jobs would be:

Alternative A: 69,800
Alternative B: 33,100
Alternative C: 14,200
Alternative D: 83,800

Net direct jobs in YBC are those that would not be produced elsewhere in San Francisco if YBC were not developed further (see page 253). That is, they reflect direct employment opportunities that are unique to YBC. If the net number of new direct jobs in YBC were 50% of the Table 34 values (see pages 253 and 271), the indirect jobs would be 50% of the above numbers.

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